DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
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5090
Ser 5CEN.MB/588
September 23, 2003

Ms. Beatrice Griffey
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Region IX, Code SFD-8-B
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Ms. Griffey, Mr. Mahmoud, and Mr. Hausladen:

The Department of the Navy forwarded the document "Draft Final Project Closure Report for Installation Restoration Site 1E at Marine Corps Base Camp Pendleton" to the Federal Facilities Agreement (FFA) team members over 30 days ago. No additional comments were received during this time period. Per FFA Section 7.9, Finalization of Documents, this Draft Final primary document is now Final.

Please place a copy of this letter in the front cover of the document. Should you have any questions, please call the Department of the Navy Remedial Project Manager, Mr. Mike Bilodeau, at (619) 532-3829.

Sincerely,

Kathie Beverly

KATHIE BEVERLY
Environmental Business Line
Team Leader
By direction of the Commander

5090
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Copy to:
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DRAFT FINAL REMEDIAL ACTION SITE CLOSURE REPORT
OPERABLE UNIT 3, INSTALLATION RESTORATION SITE 1E
32 AREA REFUSE-BURNING GROUND
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

Environmental Remedial Action
Contract No. N62474-98-D-2076
Contract Task Order 0080

Document Control Number 6505
Revision 0

August 12, 2003

Submitted to:

U.S. Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, California 92132-5190

Submitted by:

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Concord, California 94520-1120

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Prepared by:

Date: 8-11-2003

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Abbreviations and Acronyms

ARAR	applicable or relevant and appropriate requirements
ASTM	American Society for Testing and Materials
Cal/EPA	California Environmental Protection Agency
CalTrans	California Department of Transportation
CAMU	corrective action management unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	chemicals of concern
COECs	chemicals of ecological concern
COPCs	chemicals of potential concern
COPECs	chemicals of potential ecological concern
CTO	Contract Task Order
4,4'–DDD	4,4'–dichlorodiphenyldichloroethane
4,4'–DDE	4,4'–dichlorodiphenyldichloroethene
4,4'–DDT	4,4'–dichlorodiphenyltrichloroethane
DLM	designated level methodology
DON	U.S. Department of the Navy
DQO	data quality objective
DTSC	Department of Toxic Substances Control
EcoRA	ecological risk assessment
ECP	environmental control plan
EDXRF	energy dispersive x-ray fluorescence
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FWS	U.S. Fish and Wildlife Service
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration
IRP	Installation Restoration Program
IT	IT Corporation
MCB	Marine Corps Base
mg/kg	milligrams per kilogram
msl	mean sea level
NAVD	North American Vertical Datum
NOI	Notice of Intent
OU3	Operable Unit 3
PA/SI	assessment/site inspection
PED	planned excavation depth
PLE	limit of exposure
POLs	petroleum, oils, and lubricants

Abbreviations and Acronyms (Cont.)

PRG	remediation goal
QC	quality control
RA	remedial action
RD	remedial design
RD/RA	remedial design/remedial action
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
RWQCB	California Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act of 1986
SWDIV	Southwest Division Naval Facilities Engineering Command
SWPPP	storm-water pollution prevention plan
UCL_{95}	95-percent upper confidence limit
VOCs	volatile organic compounds
SVOCs	semi-volatile organic compounds
TCLP	toxic characteristic leaching procedure

Executive Summary

A remedial action was implemented pursuant to the Record of Decision (ROD) for Operable Unit 3(OU3) dated January 11, 1999 (SWDIV, 1999a), for the remediation of soil contamination at Installation Restoration (IR) Site 1E at Marine Corps Base (MCB) Camp Pendleton (base) in San Diego County, California.

IR Site 1E was a former refuse-burning ground. The site was used by the Base between 1942 and the early 1970s to burn refuse generated by the Base operations. No record is available on the specific years of operation or the volume of refuse disposed of at this site. Until 1970, all refuse at the Base was disposed of by burning. The site was covered with soil after the refuse burning was discontinued and the site was allowed to revert to natural vegetation. IR Site 1E was designated under the MCB Installation Restoration Program (IRP) as a Group C site for conducting the remedial investigation and feasibility study (RI/FS) pursuant to the process mandated by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980. The conclusions from the RI work performed for Group C sites and the RI/FS work for OU3 sites indicated that soil at IR Site 1E was impacted by past disposal activities and could pose a risk to surrounding environmental receptors and human health. As a result, remedial action was required for the protection of human health and the environment.

Remedial actions, based on the OU3 ROD, taken at IR Site 1E include the following:

- Excavation of contaminated soil: the maximum excavation depths were 5 feet for ecological concerns and 10 feet for human health concerns.
- Confirmation sampling of the bottom and sidewalls of the excavation in accordance with Methods for Evaluating the Attainment of Cleanup Standards, Volume I: Soils and Media, PB89-234959, prepared by the U.S. Environmental Protection Agency (EPA).
- Transportation to and disposal of soil meeting technical and legal requirements (i.e., specified in Title 40, Code of Federal Regulations (CFR), Section 264.552[c]) at an on-Base landfill, IR Site 7 (Box Canyon Landfill), a designated corrective action management unit (CAMU).
- Backfilling of the excavation with clean soil upon confirmation that cleanup standards were met; if standards were not met at the maximum excavation depths (i.e., 5 feet for ecological concerns and 10 feet for human health concerns), placing 5 or 10 feet of clean fill, as relevant.
- Site regrading and revegetating.

A site-specific remedial design/remedial action (RD/RA) work plan was developed to meet the OU3 ROD requirements. The RD/RA work plan provides details on the remedial action (RA) process, site preparation, remedial excavation, waste transportation and disposal, cleanup confirmation criteria and methodology, and final site restoration approach. The final remedial action for IR Site 1E was implemented in accordance with the RD/RA work plan in 1999 (excavation and disposal) and 2000 (final site restoration).

This report was prepared to document the RA details in accordance with EPA guidance for preparing final RA reports. The report provides an overview of the site-specific background and the decisions pertinent to the development of the final RA, chronology of the RA and construction activities, evaluation of the performance standards and construction quality control, site inspection and certification, post-RA operation and maintenance, and summary of project costs.

The report is supported by five appendices that provide information on the preconstruction biological survey, photographs of construction activities, backfill contractor quality control, site revegetation seed mix, and analytical data summary and documentation.

In summary, the RA at IR Site 1E was conducted in accordance with the approved RD/RA work plan. The total volume of soil removed was approximately 59,085 cubic yards (originally estimated at 2,078 cubic yards) between August and November 1999. The excavated soil from IR Site 1E was transported to and disposed of at a CAMU located at IR Site 7. The cleanup efforts were evaluated in accordance with the RD/RA work plan and found to meet the OU3 ROD requirements and cleanup standards. The excavated site was approved for final backfill and was restored with native vegetation during December 2000 and January 2001. The total cost for conducting the final RA was approximately $1.362 million (originally estimated at $0.1 million) in 1999/2000 dollars.

IR Site 1E is considered a clean closure because the residual contamination poses no unacceptable exposure risk to human health or the environment. As such, no further remedial action or post-RA 5-year reviews, monitoring and maintenance are required for IR Site 1E. The area of the original burn pits was further investigated as IR Site 1E-1 under a supplemental FS conducted for OU-4. The supplemental FS will determine whether additional remedial action is required for IR Site 1E-1 (i.e., burn pit area).

1.0 Introduction

This report was prepared by Shaw Environmental, Inc. (formerly IT Corporation) in partial fulfillment of work scope of Contract Task Order (CTO) No. 0080 issued under Southwest Division Naval Facilities Engineering Command (SWDIV) Remedial Action Contract No. N62474-98-D-2076. This report summarizes the remedial action activities implemented by Shaw Environmental, Inc. at Installation Restoration (IR) Site 1E, 32 Area refuse-burning ground, located at Marine Corps Base (MCB) Camp Pendleton in San Diego County, California.

This report will reflect the use of IT Corporation (IT) as the preparer of this report because this report describes the project activities performed by IT before Shaw Environmental, Inc. acquired IT in May 2002.

1.1 Project Background

MCB Camp Pendleton (Base) is the primary amphibious training center for the west coast. Located between the Cities of Los Angeles and San Diego, California, MCB Camp Pendleton covers approximately 125,000 acres, almost entirely in San Diego County (Figure 1-1). Surrounding communities include San Clemente to the northwest, Fallbrook to the east, and Oceanside to the south (Figure 1-1). The Base is bordered to the west by the Pacific Ocean and encompasses 17 miles of undisturbed coastal area; rolling hills and valleys range inland an average of 10 to 12 miles.

MCB Camp Pendleton and the U.S. Department of the Navy (DON) have been actively engaged in the Installation Restoration Program (IRP) since 1980. The IRP is designed pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by Superfund Amendment and Reauthorization Act (SARA) of 1986, to provide investigation and remediation, if necessary, to environmental impact caused by hazardous substances, pollutants, or contaminants. In general, the IRP consists of the following phases:

- Assessment/Site Inspection (PA/SI): The PA/SI process involves records reviews, site inspections, and sampling and data collection to identify sites that could require further investigation or remediation.
- Remedial Investigation/Feasibility Study (RI/FS): The RI process involves assessing the nature and extent of contamination to a level of detail sufficient to support the development of remedial alternatives, which are then evaluated and finalized through the FS process

- Remedial Design/Remedial Action (RD/RA): The remedial design (RD) process involves developing technical designs and analyses for the remedial alternative selected through the FS process. The detailed design plans and specifications from the RD phase are implemented during the final remedial action (RA) process.

A Federal Facility Agreement (FFA) for the Base was signed on October 24, 1990, and constitutes a legally binding agreement between the U.S. Environmental Protection Agency (EPA), the California State Department of Toxic Substances Control (DTSC), the California Regional Water Quality Control Board (RWQCB), and the DON. The FFA outlines the working relationship between the parties to the agreement and clearly defines the mutual obligations of the parties as structured to attain efficient remedial response throughout the process. In addition, the FFA establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the Base in accordance with the IRP.

The FFA segregated the IRP sites into four groups based on the PA/SI data:

- **Group A** – Sites with previous investigations prior to the RI/FS
- **Group B** – Landfills and surface impoundments
- **Group C** – Remaining sites in the Santa Margarita River basin
- **Group D** – Remaining sites outside the Santa Margarita River basin.

In this grouping process, IR Site 1E was placed in Group C. The RI phase for Group C sites was performed between December 1993 and October 1995 (SWDIV, 1996). A supplemental investigation was conducted in late 1996 (Kleinfelder, 1997) to collect additional soil samples for target metal analysis to better delineate the soil contamination. The FS for IR Site 1E was conducted as part of Operable Unit 3 (OU3) and was finalized in May 1998 (SWDIV, 1998a).

The final remedy for IR Site 1E was selected and documented in the Record of Decision (ROD) for OU3 (SWDIV, 1999a) that was issued in January 1999, and signed by the parties to the FFA during February and March 1999.

IR Site 1E is located in 32 Area (Figure 1-2), in the southeast corner of the Base. The site was one of nine refuse-burning ground scattered throughout the Base. Refuse burning was used between 1942 and early 1970s by the Base for disposal of refuse generated by the Base operation. No information is available on the specific years of operation or the amount of refuse that was disposed of at IR Site 1E.

The burn area at IR Site 1E was closed by covering it with native soil. Field reconnaissance of the site during the RI did not reveal any obvious stress to local plants and vegetation. Burn

debris was observed in areas near the burn area. Six soil borings were drilled into the burn area to collect soil samples during the RI investigation. The results indicated that the burn area does not pose unacceptable exposure risk. However, the RI results indicated that site soil in areas adjacent to the burn area posed unacceptable exposure risk to both ecological receptors and human health (see Figure 2-1 and Section 2.2 for detailed discussions). The OU3 ROD requires that the burn debris and contaminated soil be removed from the site to the extent that the residual environmental impact and exposure risk, if any, would be acceptable. To achieve this requirement, risk-based remediation standards were developed during the RI/FS process and were then specified in the OU3 ROD. An RD/RA work plan (SWDIV, 1999b) was developed, based on the remediation standards, to provide a detailed approach for conducting remedial excavation, cleanup confirmation, and final site restoration. Contaminated soil removed from IR Site 1E was disposed of in a corrective action management unit (CAMU) located at IR Site 7, Box Canyon Landfill (Figure 1-2).

In accordance with the RD/RA work plan (SWDIV 1999b), IT implemented the RA and excavated and removed about 59,085 cubic yards of burn debris and contaminated soil from the site between August 24 and November 19, 1999. The RA effort was summarized in an interim remedial action confirmation report (SWDIV, 2000a), which was reviewed by the parties to the FFA. The final site restoration plan (presented in the interim confirmation report) was approved by the parties to the FFA during the 62nd FFA meeting held on November 21, 2000 (SWDIV, 2000b). The site grade was restored between December 18, 2000 and January 12, 2001. Clean soil was imported from a borrow site located in 22 Area of the Base (Figure 1-2) for use as backfill to restore the surface grade of the burn pit area.

No further action was required because the RA met all the remediation standards specified in the ROD, and the RA at IR Site 1E is now considered complete.

1.2 Report Objectives

The primary objective of this report is to summarize the RA activities performed at IR Site 1E by IT between 1999 and 2001. In addition, chronological events related to the development of the RA, such as the RI/FS, ROD, and RD, are summarized. This report provides the documentation needed for the closure of IR Site 1E from the Base IRP listing and future actions.

1.3 Report Organization

This report was prepared in accordance with the EPA guidance for preparing a RA report (EPA, 2000a). The report was organized to include the following information:

- **Section 1.0** – Introduction
- **Section 2.0** – Site Description and Background
- **Section 3.0** – Construction Activities and Chronology of Events
- **Section 4.0** – Performance Standards and Construction Quality Control
- **Section 5.0** – Final Inspection and Certification
- **Section 6.0** – Operation and Maintenance Activities
- **Section 7.0** – Summary of Project Costs
- **Section 8.0** – References

In addition to general discussions provided in each section, supporting documents include the following:

- **Appendix A** –Construction Biological Survey Report
- **Appendix B** – Photographs of Remedial Construction
- **Appendix C** – Site Backfill Geotechnical Contractor Quality Control Report
- **Appendix D** – Site Revegetation Seed Mix
- **Appendix E** – Analytical Data Summary and Evaluation
- **Appendix F** – Review Comments.

2.0 Site Description and Background

This sections summarizes the conditions and operational background of IR Site 1E, as well as the RI/FS results, ROD requirements, RD, and the RA work plan that led to the final RA.

2.1 Site Description

This section summarizes the location, operational background, and environmental setting of IR Site 1E. The summary information in the following sections was obtained from the supplemental RI/FS for OU3 (SWDIV, 1998a).

2.1.1 Location

IR Site 1E, a refuse-burning ground in 32 Area, is located along MACS Road, approximately 0.75 mile northwest of Stuart Mesa Road and approximately 3,000 feet from the Santa Margarita River (Figure 2-1). The burn area was located in a flat area of a mesa (Figure 2-1). The disposal activity, as evident by the surface debris, expanded beyond the burn area and onto the steep slope area to the west. The site drains into a small stream-cut canyon and flows into a lagoon to the west of the mesa area. The area of the site (Figure 2-1) that required remedial action was approximately 200-feet long and 200-feet wide.

2.1.2 Operational Background

IR Site 1E is one of nine refuse-burning grounds used from 1942 through the early 1970s to burn refuse generated by Base operations. No information is available on the specific years of operation or the volume of refuse disposed of by burning at each burning ground. Until 1970, all refuse waste at the Base was disposed of by burning. The entire Base generated an estimated annual waste quantity of 20,000 to 28,000 tons distributed over the nine burning grounds. The refuse-burning areas were closed sometime between the late 1960s and 1971. Field reconnaissance of the burn area did not reveal any obvious stress to local plants and vegetation. Burn debris was observed on the surface near the burn area. Six soil borings (Figure 2-2) were drilled into the burn area to collect soil samples during the RI investigation. The results indicated that the burn area does not pose unacceptable exposure risk. However, the RI results indicated that site soil in areas adjacent to the burn area posed unacceptable exposure risk to both ecological receptors and human health.

2.1.3 Environmental Setting

This section summarizes the topography, geology, hydrogeology, ecology, and land use in the vicinity of IR Site 1E prior to the RA.

Topography – The site is located near a mesa top with an average elevation of approximately 170 feet mean sea level (msl). The burn area is relatively flat until it meets a stream-cut canyon immediately to the west of the burn area, which breaks the site grade into a very steep slope (Figure 2-1).

Surface Water Hydrology – No perennial surface water is present in the vicinity of the burn area. The tributary canyon derives some of its water from runoff originating from the burning ground during winter months. Ephemeral water from this canyon flows to an effluent lagoon about 3/4 mile to the west of the site and ultimately reaches the Santa Margarita River.

Geology – The refuse-burning ground at IR Site 1E is within the Santa Margarita Basin. The geology of this basin consists of stream-deposited younger and older Quaternary alluvium overlying bedrock of the San Mateo Formation. IR Site 1E is underlain by older alluvium, which consists of interbedded, fine- to coarse-grained, unconsolidated to poorly consolidated sand, silt, and gravel, interspersed with clay lenses.

Groundwater Hydrology – Groundwater, based on the site geology, is assumed to flow to the southwest (following the surface topography). Soil borings were drilled to a depth of 24 feet, during the RI, without encountering groundwater. The groundwater in the burn area was estimated to be deeper than 100 feet based on the elevation difference of the burn area and the bottom of the stream-cut canyon immediately to the west of the site.

Ecology – Habitat types at IR Site 1E consists primarily of Valley Needlegrass with surrounding areas of Coastal Sage Scrub. Dominant plant species include annual grass (Wild Oat and Brome), Filaree, Fennel, and Peppergrass. White Sage and Coyote Brush are the dominant plant species in the Coastal Sage Scrub habitat. Vernal pools were previously identified in this general area, but not in the immediate vicinity of the site.

Nine bird species were observed during the March 1995 surveys. Song Sparrow and Western Meadowlark were the most common. Deer Mice were the only small mammals caught in the live-traps during the March 1995 survey. No amphibians or reptiles were observed.

Pairs of Coastal California Gnatcatchers were observed during the 1997 surveys. No Pacific Pocket Mice were captured at and no Least Bell's Vireos were identified within the proposed remediation footprint for IR Site 1E in the 1997 surveys.

Surrounding Land Use – The burning ground is approximately 1 mile from the Santa Margarita River. No development is located in the immediate vicinity of the site. The burning ground is

no longer in operation, and military and civilian personnel are not frequently present at the site. The undeveloped area surrounding the site is classified as a "maneuver area" and consists of a gently sloping marine terrace covered by natural vegetation. The crucible obstacle course is located about ½ mile to the north. The nearest family housing, Stuart Mesa Housing, is approximately 1 mile northwest of the site. No existing troop housing is located within several miles of the site and none is planned.

The current use of this site, based on the future land use plans, will not change. The likelihood of future residential land use is considered low given current development plans and current land use in the vicinity of the site.

No Base drinking water production wells are located downgradient from IR Site 1E Future use of groundwater at the site is considered unlikely because of its proximity to the effluent lagoon area (within
3/4 mile).

2.2 Summary of RI/FS Results

This section provides a summary of the RI/FS results. The investigations performed for IR Site 1E include the following:

- An RI for Group C sites was conducted and documented in the *Draft Final RI Report for Group C Sites, Remedial Investigation/Feasibility Study* (SWDIV, 1996).
- A supplementary investigative effort was conducted and documented in the *Technical Memorandum for Sites 1A/1003, 1E/1004, 30, and 35* (Kleinfelder, 1997).
- A field investigation was conducted in May 1998, and is documented in the *Energy Dispersive X-Ray Fluorescence (EDXRF) Field Investigation Report, Sites 1A, 1D, 1E, 1F, and 2A* (SWDIV, 1998b)

Information extracted from the above reports is summarized with regard to the following:

- Nature and extent of contamination
- Environmental impact
- Development and selection of remedial goals
- Development and selection of remedial alternatives.

It should be noted that the following sections contain citations of regulatory criteria, goals, levels, and standards that may have changed over time. The current regulations may not be consistent with the ones cited in the study summarized in this section.

2.2.1 Nature and Extent of Contamination

RI work at IR Site 1E involved surface and subsurface soil sampling to evaluate potential contamination from the refuse-burning operation and its potential impact to human health and ecological receptors.

According to the RI results, the groundwater at IR Site 1E is not of concern. Only soil was found to be impacted by the past disposal activities. An estimated areal extent of contamination was developed, based on the soil analytical results obtained from the RI, as shown on Figure 2-2. The contamination characteristics are discussed as follows:

Organic Compounds – No organic compounds were reported at concentrations exceeding remedial goals (PRGs) or limits of exposure (PLEs) (SWDIV, 1998a). Acetone was detected in a sample collected from a depth greater than 10 feet below ground surface in soil boring 1EB-07. Phthalates were detected at depths greater than 10 feet below ground surface in borings 1EB-02, 1EB-05, and 1EB-07 (Figure 2-2).

Chlorinated pesticides [delta-BHC; alpha-chlordane; gamma-chlordane; 4,4'-dichlorodiphenyldichloroethane (4,4'–DDE); 4,4' dichlorodiphenyltrichloroethane (4,4'–DDT); dieldrin; and endosulfan II] were detected in the upper 5 feet of soil in borings 1EB-02 and 1EB-03.

Inorganic Compounds – Based on the Group C RI results (SWDIV, 1996), six metals were detected at concentrations exceeding PRGs: antimony, arsenic, beryllium, cadmium, chromium, and lead. The majority of the metals with concentrations exceeding PRGs were reported in shallow (0 to 5 feet) soil from borings 1EB-01, 1EB-02, 1EB-03, 1EB-04, and 1EB-06 (Figure 2-2).

Inorganic constituents detected at concentrations exceeding the PLEs (i.e., aluminum, antimony, barium, boron, chromium, cobalt, copper, iron, lead, molybdenum, silver, and zinc) were reported at sampling locations 1EB-01, 1EB-03, 1ESS002, and 1ES003 (Figure 2-2). With the exception of boron, the maximum concentrations of these constituents also exceeded the background concentrations. A background concentration is not available for boron.

In late 1996 a supplemental RI (Kleinfelder, 1997) was conducted and focused on the area near the bottom of an existing canyon to evaluate potential impact from surface runoff and contaminant transport. Overall, this investigation confirmed the presence of elevated concentrations of antimony, arsenic, boron, cadmium, chromium, cobalt, lead, and zinc in the canyon and on the slopes west of the burn area. Inorganic concentrations exceeding PRGs or

PLEs and background concentrations were reported at K1EB-01, K1EB-06, and K1EB-07 (Figure 2-2).

The May 1998 field investigation (SWDIV, 1998b) involved the collection and analysis (with EDXRF in the field on real-time basis) of 42 soil samples from hand auger boring locations at IR Site 1E to refine the extent of site contamination. Eleven of the samples were collected from background locations. The samples were analyzed for antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, and zinc.

As the EDXRF sampling effort proceeded and the EDXRF screening results were compared to the remedial goals established in the FS, nearly all detections exceeded the remedial goals. A comparison of the EDXRF results and fixed laboratory results showed that the EDXRF results are biased higher. To use the EDXRF results for refining the site boundary, EDXRF revised comparison goals were developed. These comparison goals were established by collecting soil samples from site-specific background locations for IR Site 1E, analyzing using EDXRF, and calculating new site-specific background values. In instances where all new background data were non-detect, the original goal was retained. In a few cases where the background value was less than the PRG or PLE, the original PRG or PLE value was retained.

The estimated areal extent of contamination was developed, based on these new data collected at IR Site 1E in May 1998, as shown in Figure 2-2, along with the boundary of debris noted in the soil borings.

2.2.2 *Environmental Impact*

The environmental impact as a result of the site contamination was evaluated by performing a human health risk assessment (HHRA) and an ecological risk assessment (EcoRA). A detailed discussion of the assessments is presented in the RI for Group C sites (SWDIV, 1996). The summary information in the following sections was obtained from the RI/FS for OU3 (SWDIV, 1998a).

Human Health Risk Assessment – No organics were retained as chemicals of concern (COCs) in the IR Site 1E HHRA. Five metals (antimony, arsenic, cadmium, chromium, and lead) were retained as final COCs in the HHRA. The physical properties of these metals cause them to migrate very slowly through the soil profile. In addition, they are stable in the environment and do not degrade. The solubilities of these constituents in the environment are sometimes also controlled by the availability of certain anions (e.g., carbonate/bicarbonate, sulfate, or hydroxide, etc.). The fate and transport of chromium is controlled primarily by the pH value and redox

potential in the environment. None of the chemicals of concern were at concentrations expected to pose a threat to the site groundwater based on the designated limit methodology (DLM) calculation (RWQCB, 1989).

The primary contributors to the soil screening risk/hazard were metals that exceeded background concentrations. By removing the portion of the risk and hazard index (HI) contributed by chemicals at concentrations below background concentrations, the cumulative incremental risk and HI are $4x10^{-4}$ and 18.4, respectively. The site-related primary contributors to risk or hazard are antimony, arsenic, and chromium. In addition, the maximum lead concentration (1,610 mg/kg) exceeded the background values, the EPA residential PRG of 400 mg/kg, and the California-EPA (Cal/EPA) residential soil PRG of 130 mg/kg.

Ecological Risk Assessment – The Baseline EcoRA provides a qualitative or quantitative appraisal of actual or potential effects of contaminants on plants and animals (other than humans and domesticated species). Seventeen inorganic chemicals of potential ecological concern (COPECs) that exceeded background values, all organic COPECs, and boron were retained for the initial ecological risk screening. The results of the initial risk screening indicated that the maximum concentrations of 15 inorganic constituents exceeded PLEs. COPECs with hazard quotients (HQs) greater than 1.0 were grouped into areas of concern based on sample locations at which PLEs were exceeded for any representative species. The PLEs for birds and mammals were modified based on the size of the area of concern and the foraging range for each representative species. The modified PLEs were then used to conduct the final screening.

Biota tissue collected from plants and invertebrates were compared against reference concentrations to evaluate adverse effects caused by bioaccumulation in ecological receptors. The comparisons indicated that arsenic and mercury concentrations of plant tissues were slightly elevated. Comparisons against reference concentrations for invertebrates indicated that tissue concentrations of cadmium, copper, and zinc were slightly elevated.

The final risk-screening results exceeded modified PLEs for plants, invertebrates, California Quail, Coastal California Gnatcatcher, and Pacific Pocket Mouse. COPECs with modified HQs greater than 1 included: aluminum, antimony, barium, boron, cobalt, copper, iron, lead, molybdenum, silver, and zinc. COPECs with modified HQs exceeding 1 were retained as chemicals of ecological concern (COECs), with the exception of barium, boron, molybdenum, and silver. Barium did not pose a risk because HQs above 1.0 were largely caused by background concentrations. Boron was not retained because the HQs were close to 1 (1.2 to 1.5). Molybdenum was not retained as a COEC because the HQs were close to 1 and

plants were the only representative species for which PLEs were exceeded. Silver was not retained because it was detected only at 1ESS002 and 1ESS003 (Figure 2-2). At 1ESS002, the HQs for silver only slightly exceeded the plant PLE (HQ of 1.04). At 1ESS003, only one of the detected results exceeded the plant and invertebrate PLEs; the HQs for the other detected silver concentrations were less than 1.

2.2.3 Development and Selection of Remedial Goals

The remedial objective for IR Site 1E was to minimize exposure to chemicals in soil at concentrations exceeding the background concentrations, PRGs (for humans), levels considered protective of groundwater, and PLEs (for plants, invertebrates, birds, and mammals). Each criterion was considered in the selection of contaminant-specific remedial goals (SWDIV, 1996).

For a given COC, the corresponding human health risk-based standard (i.e., PRGs under a residential scenario) was compared against the background concentration. The background values used were established during the RI and were agreed upon by the regulatory agencies. The higher value of the two is considered the remediation goal for human health protection.

From an ecological perspective, the remediation goal was selected by comparing the background concentration with an appropriate ecological risk management goal and retaining the greater of the two values. The ecological risk management goal for each COC was set at the most stringent PLE for the species of most concern at each site.

The lower of the two values (i.e., human health or ecological) was then selected as the proposed remediation goal for the COC in soil ranging between 0 and 5 feet below ground surface. The remediation goal for human health protection was selected as the proposed remediation goal for COCs in soil ranging between 5 and 10 feet below ground surface.

Finally, the soil concentration limits for the protection of groundwater that were calculated based on the DLM were compared with the proposed remediation goals selected for the protection of human and ecological receptors. The most stringent values were selected as the final proposed remediation goals.

The following compounds were retained as final COCs for Site 1E: aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, and zinc. The finalized remedial standards for the COCs at IR Site 1E are presented in Table 2-1.

2.2.4 Development and Selection of Remedial Alternatives

Remedial technologies, including institutional action, capping, excavation, landfilling, chemical treatment, physical treatment, biological treatment, and thermal treatment, were evaluated during the development of remedial alternatives. Three remedial alternatives were developed during the FS process as potential RAs for the site:

- **Alternative 1** – No Action
- **Alternative 2** – Excavation/Removal and On-Base Disposal
- **Alternative 3** – Excavation/Removal and Off-Base Disposal.

Remedial alternatives were assessed based on the following evaluation criteria:

- Overall protection of human health and the environment
- Compliance with applicable or relevant and appropriate requirements (ARARs)
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost.

Alternative 2 was selected as the most effective remedy for IR Site 1E based on the comparative analysis detailed in the RI/FS for OU3 (SWDIV, 1998a). This alternative includes removal of contaminated soil via mechanical excavation. Upon removal, the impacted soil from IR Site 1E was transported to IR Site 7 (Box Canyon Landfill), which has been designated as a CAMU for on-base disposal. The effectiveness of the soil excavation would be evaluated by collecting and analyzing confirmation samples during excavation. Future exposure pathways, if any, would be eliminated by backfilling the excavation areas with clean backfill.

Implementation of Alternative 2 was intended to reduce potential future risks to human health and the environment by reducing COCs to PRGs, background, low incremental ecological risk concentrations, and levels protective of groundwater. Because the majority (if not all) of the impacted soil would be permanently removed from the site, future soil remedial activities would not be necessary.

2.3 Record of Decision

The final remedy for IR Site 1E was issued under the ROD for OU3 sites in January 1999. The ROD was signed by parties to the FFA during February and March 1999. RA activities, based on the OU3 ROD, to be taken at IR Site 1E must consist of the following:

- Excavation of contaminated soil: the maximum excavation depths were 5 feet for ecological concerns and 10 feet for human health concerns.
- Confirmation sampling on the bottom and sidewalls of the excavations in accordance with EPA (1989) guidance.
- Transportation and disposal of soil meeting the technical and legal requirements (i.e., specified in Title 40, Code of Federal Regulations [CFR], Section 264.552[c]) at an on-base landfill (IR Site 7 – Box Canyon Landfill) designated as a CAMU.
- Backfilling of the excavation with clean soil upon confirmation that cleanup goals were met and, if goals were not met at the maximum excavation depths (i.e., 5 feet for ecological concerns and 10 feet for human health concerns), placing 5 or 10 feet of clean fill.
- Site regrading and revegetating.

2.4 Remedial Design

According to the ROD, previous refuse-burning activities impacted soil at IR Site 1E. The residual metal concentrations in the site soil would present unacceptable risks to human health and the environmental. Based on the RI/FS results, removal of soil containing COCs with concentrations exceeding the remedial standards (Table 2-1) was determined to be the most effective way to achieve protection of human health and the environment. The detailed approach for conducting the soil removal action was provided in the RD/RA work plan (SWDIV, 1999b), which was reviewed and approved by the parties to the FFA. The RA sequence and decision process, as developed in the RD/RA work plan, is summarized in Figure 2-3. The remedial action at IR Site 1E consisted of the following work:

- Surveying the preexcavation site and laying out the boundary of excavation as identified by the RI/FS process
- Clearing existing vegetation in the excavation area and preparing the site for excavation, temporary soil stockpiles, and transportation operations
- Collecting perimeter confirmation samples at 100-foot intervals to verify the planned excavation boundary
- Conducting removal excavation activities to meet the remedial standards

- Collecting excavation confirmation samples in accordance with the confirmation sampling and analysis program prescribed in the RD/RA work plan
- Transporting the excavated soil to the Box Canyon Landfill and placing it in the designated CAMU in accordance with the CAMU design
- Backfilling the excavated areas in accordance with the backfill design and restoring the site drainage grade and vegetation
- Surveying the postexcavation site and preparing an as-built report to document the RA process, confirmation sampling results and analyses, the effectiveness of the RA, and the as-built status of the site.

The following sections summarize the RD approaches and RA decision process.

2.4.1 Site Preparation

The planned excavation boundary is shown in Figure 2-4. The extent was based on conclusions from the May 1998 EDXRF investigation (SWDIV, 1998b). The layout of the traffic route, equipment laydown area, and soil stockpile area is also shown in Figure 2-4. Confirmation samples would be collected every 100 feet along the excavation boundary or, alternatively, at areas of visible stains or surface contamination to verify the extent of contamination. The results from perimeter sampling would be used to determine whether subsequent changes to the horizontal and vertical extent of the planned excavation would be needed.

Additional site preparation work such as underground utility clearance, surface-water management, traffic control, environmental control, and pollution prevention management were also developed and included in the RD/RA work plan and are discussed in Section 2.4.6.

2.4.2 Remedial Excavation

The remedial excavation, based on the RD/RA work plan, would be started near the top flat areas and proceed to the slope areas. A track excavator would be used for the excavation. The planned excavation depth (PED) is shown in Figure 2-4. The excavation strategy was to minimize the excavation depth while meeting the remedial objectives. In areas where the remedial goal was to remove contaminants to eliminate ecological risk and there was no exposure risk to human health, the maximum initial excavation depth would be 5 feet below ground surface. The same strategy would be used for the removal of contaminants posing risk to human health exposure. In the latter case, the maximum initial excavation depth would be limited to 10 feet below ground surface. If the contamination could not be fully removed at the maximum initial excavation depths, further RA, including limited hot spot removal or effective remedial backfill, would be implemented, as required, to remediate the site.

As shown in Figure 2-4, front-end loaders or dump trucks would transport excavated soil to two centralized stockpiles. The stockpile locations were designed to facilitate a traffic-routing pattern that would maximize the efficiency of transportation of the excavated soil. The size of the stockpile was designed to encompass an approximate day's worth of work (about 2,000 cubic yards) that could be transported to the CAMU at Box Canyon Landfill. The equipment used for excavation and management of contaminated soil would remain within the excavation area. Equipment outside the excavation area would be maintained clean throughout the construction.

Excavations would be conducted only in dry weather and low wind conditions. Plastic visqueen and other additional dust control devices would be used depending on weather conditions. Water would be used as the primary dust control media. Workers in the excavation area would be protected in accordance with the site-specific health and safety plan.

2.4.3 Confirmation of Remedial Action

The OU3 ROD requires that confirmation sampling be performed on the bottom and sidewalls of excavations in accordance with EPA (1989) guidance. According to the RD/RA work plan, the confirmation sampling program would start with collection of perimeter confirmation samples along the preexcavation boundary. Samples would be collected at 100-foot intervals along the perimeter and from half and full depths of the planned excavation. These perimeter samples would be used as the wall confirmation samples. Floor samples would be collected from the excavated surface and from 2 feet below the bottom of the excavation after the planned depth was reached. The surface samples would be analyzed first to assess the effectiveness of excavation. Should the surface sample exceed the remedial goals, below-grade samples would be analyzed to assess the extent of contamination.

The primary criterion for confirming that the cleanup standards are met is that 95-percent upper confidence limit (UCL_{95}) of the confirmation sample mean must be equal to or less than the specified cleanup standard. To achieve this, floor confirmation samples would be systematically collected from a square grid pattern of 30 by 30 feet. The starting point of the sample grid would be randomly selected prior to the remedial excavation. The grid space and number of samples were designed and determined in accordance with the statistical test method provided in the EPA (1989) guidance. The sampling grid was designed such that the confirmation sampling data

would meet certain data quality objectives to be verified by statistical tests. The data quality objectives were to achieve the following:

- Less than 5 percent probability that a residual hot spot with a size larger than a radius of 40 feet was left undetected
- A confidence level of 95 percent (false positive rate of 5 percent) at a risk of 20 percent (false negative rate of 20 percent) when the site was declared remediated with regard to meeting the cleanup standards.

If the above objectives could not be met through statistical tests, data would be evaluated manually following the data evaluation process presented in Figure 2-5. Because the site contained multiple COCs, it would be possible that removal of some of the COCs would be more difficult than for others. In such a case, multiple criteria would be applied, on a case-by-case basis, for developing the most appropriate action for achieving site closure. The evaluation criteria would include the extent, concentrations, and characteristics of the residual contamination; the risk associated with exposure to such contamination; the cost-effectiveness of additional removal excavation and effective remedial backfill; and future use of the site. The subsequent RA included the following alternatives depending on evaluation of the above criteria:

- **No Further Action** – The evaluation indicates that the risk associated with exposure to such residual contamination is low due to the characteristics (i.e., residual concentration, final location, and exposure pathway) of the contaminant and future use of the site. In such a case, the site would be backfilled and restored.
- **Hot Spot Removal** – If the evaluation indicates that the residual contamination is limited and could be economically removed with additional excavation or that the exposure risk could be effectively reduced by additional excavation, hot spots would be identified and removed with additional excavation. Additional confirmation samples would be collected and new data would be added to the original data pool for analysis.
- **Remedial Backfill** – If the evaluation indicates that the contamination could not be economically removed to meet the remedial goals or effectively reduce the exposure risk, the maximum excavation depths would remain 5 feet below ground surface for contamination involving ecological risk and 10 feet below ground surface for human health risk. The site would then be backfilled and restored with clean soil to a minimum depth of 5 feet to eliminate future risk of ecological exposure to residual contamination or to 10 feet to eliminate human health exposure. The area requiring remedial backfill would be identified so that the final grade of the restored site could meet the minimum depth requirements, as well as drainage and erosion control needs.

2.4.4 Transportation and Disposal

According to the RD/RA work plan, excavated material from IR Site 1E would be placed in dump trucks and covered with tarps prior to being transported to the CAMU at the Box Canyon Landfill (IR Site 7). The transport trucks would access the site via a dedicated haul road (Figure 2-4), maintained and kept free of impacted soil from the excavation area. Signs and guide markers would be used to prevent trucks transporting impacted soil to the landfill from driving over contaminated soil at the excavation site. A separate decontamination area would be maintained at the site to clean the tires and other exterior surfaces of any transfer trucks, if necessary, prior to their leaving the site.

The soil excavated from IR Site 1E would be contained in the designated CAMU at the Box Canyon Landfill. The RD concluded that an estimated 2,100 cubic yards of excavated soil would be deposited in the CAMU and eventually covered with a minimum 6 feet of clean soil designed for the closure of Box Canyon Landfill.

2.4.5 Site Restoration

The backfill grade in the RD was to eliminate the residual risk, if any, associated with the COCs and to restore the existing drainage patterns on the site. After the site grade was restored, the disturbed areas would be revegetated with native plant species to restore the vegetation.

2.4.6 Environmental Control Plan

An environmental control plan (ECP) was prepared as part of the RD/RA work plan to provide specific information related to the excavation and disposal of contaminated soil to ensure adequate environmental protection during remedial activities. Specific environmental protection issues addressed by the ECP were as follows:

- Land resources management
- Water resources protection (spill prevention and control)
- Storm-water pollution prevention plan (SWPPP) (meeting RWQCB storm-water discharge permit requirements per the National Pollutant Discharge Elimination System mandate)
- Wildlife resources management (biological monitoring and field management in accordance with biological assessment recommendations)
- Dust/airborne contaminant control and monitoring
- Traffic control, in accordance with California Department of Transportation (CalTrans) manual (CalTrans, 1996)

- Noise control
- Erosion control and winterization (in accordance with RWQCB best management practices).

2.4.7 Regulatory Permitting

Although permits are not required for implementing a CERCLA RA, all construction activities were conducted in full compliance with the substantive requirements of applicable permits. A notice of intent (NOI) and SWPPP were submitted to the RWQCB as required for any construction activities involving grading work greater than 5 acres. Although the planned grading work at IR Site 1E was less than 5 acres, the RA activities were managed under one integrated SWPPP developed for the entire OU-3 RA (i.e., CAMU and other OU-3 RA sites). The SWPPP was a part of the RD/RA work plan.

3.0 Construction Activities and Chronology of Events

In accordance with the RD/RA work plan (SWDIV, 1999b), the remedial action process at IR Site 1E consisted of the following tasks:

- Surveying the preexcavation site and laying out the excavation boundary identified by the RI/FS process
- Clearing existing vegetation in the excavation area and preparing the site for excavation, temporary stockpiling, and transportation operations
- Collecting perimeter confirmation samples at 100-foot intervals to verify the planned excavation boundary
- Excavating soil to meet the remedial goals
- Collecting excavation confirmation samples in accordance with the confirmation sampling and analysis program, and evaluating the confirmation data in accordance with the decision process
- Transporting the excavated soil to the Box Canyon Landfill (Site 7) and placing it in the designated CAMU in accordance with the CAMU design
- Backfilling the excavated areas in accordance with the backfill design and restoring the site drainage grade and vegetation
- Surveying the postexcavation site and preparing an as-built report to document the RA process, confirmation sampling analyses and results, effectiveness of the RA, and as-built status of the site.

This section provides a chronology of the various construction activities conducted since the mobilization of construction in June 1999. The chronology is divided into four stages based on the types of field activities: preexcavation, excavation, confirmation sampling, winterization, and final site restoration. Each stage is discussed separately in the following sections.

3.1 Preexcavation Activities

Several tasks were performed to prepare the site for construction before the start of soil removal activities at IR Site 1E, including site surveying, perimeter confirmation sampling, preconstruction biological surveying, and site preparation.

3.1.1 Preconstruction Site Survey

In accordance with the work plan (SWDIV, 1999b), the planned excavation boundary, shown in Figure 2-4, was surveyed and marked on the ground. In general, surveyors placed stakes at

100-foot intervals along the excavation to delineate the excavation boundary. Additional stakes were positioned between curves. Each stake was offset 3 feet outward from the actual boundary to accommodate the sloping factor from the remedial excavation (i.e., the remedial excavation starts at the staked line). The stakes were identified by the site number and a four-digit number designated by the surveyors. All surveys were conducted under the supervision of a California-registered licensed land surveyor using the State Plane Coordinates based on the North American Vertical Datum (NAVD) of 1988.

3.1.2 Perimeter Sampling

In accordance with the work plan (SWDIV, 1999b), perimeter samples were collected at 100-foot intervals to verify the planned excavation boundary. A total of 9 perimeter sample locations were identified as part of the preconstruction boundary survey. The planned site boundary and stake locations are shown in Figure 3-1. Soil samples were collected using a hand auger on December 9, 1998. Because the planned excavation depth is only 3 feet, only one sample, instead of two as specified in the work plan, was collected from each boring at the full depth of the planned excavation. These perimeter samples were also intended for use as wall confirmation samples in accordance with the work plan. The initial perimeter confirmation sampling results (Table 3-1) indicated that COCs exceeding the cleanup standards were found at three locations (sample 1E-1183, 1E-1185, and 1E-1187) and required further sampling action to delineate the excavation boundary. Additional step-out sampling at these locations began on August 18, 1999. The step-out sampling process and results are discussed in Section 3.3.

3.1.3 Biological Assessment

A meeting with the U.S. Fish and Wildlife Services (FWS) was held on May 20, 1999. It was decided that a preconstruction biological survey should be conducted to verify potential biological impacts, if any, as analyzed in the biological assessment (SWDIV, 1999c). The preconstruction biological survey for Site 1E was conducted on July 13, 1999, by a biologist qualified and permitted to survey for the Coastal California Gnatcatcher, Southwestern Willow Flycatcher, Least Bell's Vireo, California Least Tern, and Southwestern Arroyo Toad. Findings from this survey confirmed those presented in the biological assessment (SWDIV, 1999c). The assessment concluded that mitigation measures were required for Southwestern Arroyo Toads because of the site's close proximity to Santa Margarita River and other potential breeding areas. Approval for clearing and grubbing activities was given following the installation of a toad fence around the site. The toad fence was used to prevent toads from entering the site. Biological monitors stayed on site during the entire excavation process to monitor the Southwestern Arroyo

Toad activities. None was observed throughout the construction. Copies of the preconstruction and postconstruction biological survey report are included in Appendix A.

3.1.4 Site Preparation

The majority of the site preparation activities were performed between August 9 and 17, 1999, and included the following:

- Mobilizing equipment and personnel
- Obtaining clearances for underground utilities
- Installing silt/toad fencing around the identified remedial activity area prior to beginning operations, to control sediment transport and as a mitigation measure for preventing the Arroyo Toad from entering the site
- Obtaining access to a water supply and approval on a backflow prevention device
- Setting up an on-site staging area, fuel storage and containment system, storage and restroom facilities, and personnel rest/decontamination areas in accordance with the work plan (SWDIV, 1999b)
- Installing temporary fencing (bright-orange plastic mesh fence) along the entire excavation boundary and warning signs (stating *Danger Hazardous Waste Area, Unauthorized Personnel Keep Out*) at locations open to off-site traffic
- Building an on-site access road for truck operations
- Installing signs along the trucking route between IR Sites 1E and 7
- Clearing and grubbing vegetation
- Installing surface-water management (temporary diversion soil berms) and erosion control devices (silt fence and straw bales) at the stockpile location and along the streambed as preventive measures
- Installing survey control points, grade stakes, and interior excavation boundaries
- Establishing a grid system for collecting floor confirmation samples

According to the work plan, a pattern grid of 30- by 30-foot squares (Figure 3-1) was laid out from a randomly selected starting point. Floor confirmation samples were to be collected from the node points, as required.

The site preparation work was completed on August 17, 1999. Test trenching to confirm the depth and characteristics of the contaminated soil was not conducted because of the shallow depth and small area of the planned excavation. It was decided that the confirmation samples

collected from the excavation floor at the planned depth would determine whether additional removal action was required in that area.

No unusual types of wastes (e.g., unlabeled drums or containers with unknown contents) were identified during the site clearing and grubbing process.

3.2 Remedial Excavation Activities

Remedial excavation activities at IR Site 1E began on August 18, 1999. The excavation was generally conducted in the following two phases:

- Planned Excavation: Although the initial test trenching indicated that the waste depth in certain areas exceeded the PED, it was decided that the first phase of the excavation would be terminated at the planned depth. Floor confirmation samples would be collected to assess whether residual contamination was present and further excavation was required. The planned excavation was performed between August 18 and 27, 1999.
- Overexcavation: If the floor confirmation sample collected at the PED exceeded the cleanup standard, overexcavation was conducted to remove the contamination. At IR Site 1E, overexcavation essentially removed all visible waste debris. New floor confirmation samples were collected after the overexcavation was completed to verify the effectiveness of overexcavation.

The following sections summarize the excavation activities performed during each of the two phases and the total quantity of waste removed from IR Site 1E. Photographic documentation of the removal excavation process is presented in Appendix B.

3.2.1 Planned Excavation

The first phase of the remedial excavation process began on August 18, 1999. Excavation of contaminated soil began at the southeastern corner of the planned excavation area near perimeter location 1181 (Figure 3-1). The planned excavation activities were conducted in a counter-clockwise fashion around the site using only one track excavator and one rubber-tire loader to excavate, stockpile, and load contaminated soil. The 3-foot target depth for the planned excavation was maintained throughout the excavation area. Excavated waste and soil were placed in a temporary stockpile area and then transferred into 20-cubic-yard end-dump trucks. The site layout during this phase is shown in Figure 3-2.

Excavated waste and contaminated soil were transported to the CAMU at IR Site 7 – Box Canyon Landfill for final disposal. Signs identifying the trucking route were installed at all major road crossings. All trucks were required to use tarps to cover the waste. No trucks were allowed to leave the site without proper tarp covers. Remedial excavation continued in this

fashion until August 27, 1999, when the planned excavation depth for the site was completed. At this stage, about 2,100 cubic yards of contaminated soils were removed. Visual inspection of the site indicated that the burn debris or waste extended deeper and farther than the planned boundary. The interim floor confirmation sampling results (Table 3-2) indicated that the contamination was still significant throughout the excavated area. Overexcavation would be required to remove the contamination.

3.2.2 Overexcavation

Inspections of the excavated area during the planned excavation activities revealed ash-like soil extended beyond the planned excavation boundary. The floor confirmation sampling results (Table 3-2) also indicated that the majority of the excavated areas were still significantly above the cleanup standards. It was decided, based on these results, to expand the remedial excavation to remove all visible burned debris and ash material through an overexcavation.

Prior to beginning full-scale overexcavation, multiple test trenches were dug between September 3 and 9, 1999 to assess the extent and depth of the debris area. The trenching investigations revealed that wastes were present in the slope and the ravine area of the stream-cut canyon immediately to the west of the burn area (see trenching locations and conditions on pictures in Appendix B). The characteristics of the burn ash and debris found along the slope were consistent with those encountered during the planned excavation. The depth of debris encountered during the trenching also greatly exceeded the initially established planned excavation depth of 3 feet (some trenches were as deep as 20 feet in the ravine).

Full-scale overexcavation began on September 14, and was continued into November 19, 1999. Additional equipment and haul roads were required to effectively remove and transport contaminated soil from the slope. The burn debris was excavated until the surface soil was visibly clean. A new confirmation sampling grid system (Figure 3-3) was established to cover the overexcavated area. Because the area of excavation was expanded considerably, the new sampling grid increased the space between grid points from 30 feet to 67 feet. Additional soil samples were collected once the excavated surface was visually clean. The overexcavation was conducted in this fashion until the extent of contamination was confirmed and a new site boundary was established.

On October 5, 1999, an aerial photograph of the site dated February 18, 1970 was found in the Base archives. The photograph showed the site conditions while it was still active. The photograph indicated that the site had five burn pits to the south of the planned excavation area (Figure 3-4). The burn pit area shown in the photograph was investigated during the RI stage.

Five soil borings were drilled in burn pits to collect soil samples (Figure 2-2). However, the RI results indicated that the level of soil contamination would not pose unacceptable exposure risk. The photograph suggested that the waste was probably first burned in the pits and then pushed over to the slope area and into the ravine, which explained the large quantity of burn debris found in these areas. A comparison of this photograph and the current site configuration further suggested that MACS Road was realigned (Figure 3-4) such that three original burn pits now appear to be covered under MACS Road and its foundation embankment. The exact time of the road realignment construction is not known.

The overexcavation was terminated on November 19, 1999. At the completion of the overexcavation phase, all visible burn ash and debris had been removed from the excavated areas. The burn pit area, however, was not excavated or exposed. The overexcavation expanded the excavation area from approximately 0.43 acres into approximately 3.5 acres (Figure 3-3). The floor confirmation samples were collected when the area was free of visible debris or when the underlying native soil layer was encountered. The final confirmation results are shown in Table 3-3 and discussed further in Section 3.3.

3.2.3 Excavation Quantities

The total excavation quantities were estimated according to the recorded loads of excavated material transported to the CAMU. The daily trucking record is summarized in Table 3-4. Between August 24 and November 19, 1999, a total of 4,545 loads were recorded. An approximate value of 13 in-place cubic yards per truck was calculated based on loading observations and calculations from surveys at the CAMU. According to this estimate, the total quantity of waste materials removed from IR Site 1E was about 59,085 cubic yards, or about 57,008 cubic yards more than estimated in the work plan.

3.3 Confirmation Sampling Activities

The OU-3 ROD (SWDIV, 1999a) identified the COCs for IR Site 1E as aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, and zinc. Site-specific soil remediation goals (Table 2-1) were specified for soil depths extending from ground surface to 5 feet below ground surface and from 5 to 10 feet below ground surface. For a given COC, HHRA-based standards (i.e., PRGs) and ecological exposure limits (i.e., PLEs) were compared against established site background concentrations and the higher value for each COC was selected as the remediation goal. Because human and ecological receptors could both be exposed to soil contamination in the upper 5 feet, the more stringent (lower value) of the two limits was selected as the proposed remediation goal. Remediation goals for soil from 5 to 10 feet were evaluated

only for the human health concern because no complete exposed pathways exist for ecological receptors.

In accordance with the work plan, the initial floor confirmation soil samples were collected at each node of a grid system composed of 30- by 30-foot squares. This grid was later expanded to a system of 67- by 67-foot squares as the excavation area was expanded from 0.43 acres into 3.5 acres (Figure 3-3). A hand auger was used to collect soil samples at depths of 6 inches and 2 feet below the surface of the excavation. The 6-inch samples were analyzed first to assess the effectiveness of the remedial excavation. If the 6-inch sample exceeded the remediation standards, the 2-foot sample was analyzed to assess the extent of contamination. Surveyors maintained grid node locations and elevations throughout remedial excavation activities.

Collection of the excavation confirmation samples began on August 25, 1999. Excavation floor confirmation samples were collected continuously and systematically when the desired excavation depth was reached. In general, the samples were collected in three stages: planned excavation stage, overexcavation stage, and final confirmation stage. The three stages are discussed in the following sections.

3.3.1 Planned Excavation Stage

Sampling for the planned excavation activities was completed on August 30, 1999. Eighteen samples (not including quality control [QC] samples) were collected from the 22 grid point locations initially established (Figure 3-1). Initial sampling results are presented in Table 3-2. Four grid locations were not sampled because the sampling grid spacing was changed to accommodate the expansion of excavation as discussed in Section 3.2.1. Sampling locations and elevations were surveyed after excavation activities were completed to verify that the planned removal depth had been achieved.

As discussed in Section 3.1.2, the preconstruction perimeter sampling results indicated that additional step-out sampling was required at sample location 1E-1183, 1E-1165, and 1E-1187. These step-out samples were collected on August 18, 1999. Two samples were collected 10 feet south of sample location 1E-1183 (1E-1183-10) at depths of 1.5 and 3.0 feet. Rather than taking step-outs directly west of 1E-1185 and 1E-1187, two new perimeter sample locations were selected in order to establish a new western boundary for this portion of the excavation area. Two samples were collected from each of these new locations (1E-1190 and 1E-1191) at depths of 1.5 and 3.0 feet (Figure 3-1). Results for these samples indicated that the existing boundary needed to be extended farther to the west in order to meet the required cleanup standard. Therefore, on August 25, 1999, three new western perimeter sample locations in Figure 3-1

(1E-1193, 1E-1194, and 1E-1195) were selected and two samples were collected from each of them in the same manner as before. Results for these samples also exceeded the established cleanup standards and indicated that additional expansion of the excavation boundary would be needed in order to achieve the cleanup standards.

3.3.2 Overexcavation Stage

The excavation boundary had to be expanded considerably in order to remove the burn debris based on the evaluation of confirmation sample results, step-out sample results, and test trenching observations. During the step-out sampling process, burn debris and ash were noted in samples taken from locations 1E-1190, 1E-1193, 1E-1194, and 1E-1195 (Figure 3-1). Results from each of these samples exceeded several of the COC cleanup standards. Burn debris/ash appeared to be the primary source of contamination based on similar results obtained from other OU-3 sites (i.e., Sites 1A and 1F). Therefore, a decision was made to expand the excavation to remove all visible burn debris. The site was overexcavated between September 19 and November 19, 1999. At the end of the overexcavation, the excavated area was expanded to cover an area of about 3.5 acres (Figure 3-3). The sampling grid was also expanded into a 67- by 67-foot square grid system (Figure 3-3) to meet the data quality objectives (see Section 2.4.3). The new 67-foot based sampling grid required 27 grid-node locations to be sampled. The floor confirmation samples were collected when the overexcavated area was free of visible debris or when the excavation reached native underlying soil layer (a hard, distinctive bluish silty clay). The final confirmation sampling results at the completion of the overexcavation are presented in Table 3-3. At each grid point the sequence of sampling is indicated by a number following the sample location number (e.g., 1EQ12-03 means the third sample collected from grid location Q12). The sampling results indicated that the overexcavation achieved the cleanup standards with the exception of iron and one copper "hot spot" found in sample location O12. The iron cleanup standard was discussed in the 52nd FFA meeting held on November 8, 1999 (SWDIV, 1999d). It was decided that the residual level of iron found at the site would not warrant further removal excavation. Additional discussions on the iron issues and the overall effectiveness of the excavation are provided in Section 4.0.

3.3.3 Final Confirmation Stage

Additional perimeter samples, due to a considerable expansion of the remedial excavation boundary, were collected along the newly established excavation boundary. On February 29, 2000, perimeter confirmation samples were collected from eight locations (Figure 3-5) at 100-foot intervals along the northern and western portions of the site. Confirmation samples were taken 6 inches into the excavation wall at points half and full depth of the excavation. Only the

half depth sample was taken if the excavation did not exceed a depth of 2 feet. Results for these eight samples are listed in Table 3-5.

The copper level (187 milligrams per kilogram [mg/kg]) in floor confirmation sample from grid point O12 was considerably higher than the copper cleanup standard (26 mg/kg). Per the work plan, grid point O12 was treated as a hot spot. Additional hot spot sampling (Figure 3-5) was performed in accordance with the work plan on July 13, 2000. One soil sample was randomly collected from each of the four neighboring grid spaces centered by O12. The results are shown in Table 3-6. The hot spot sampling data were discussed in the 60th FFA meeting held on September 12, 2000. Because the copper level in one of the samples (1E-O12A1 in Table 3-6) was slightly higher than the cleanup standard, on September 29, 2000, two additional composite samples (1E-O12-CS1 and -CS2 in Table 3-6) were collected to evaluate the average copper contamination. The composite samples are composed of 4 soil samples randomly collected from the hot spot grid (Figure 3-5). The composite samples were also analyzed in accordance with toxic characteristic leaching procedure (TCLP). The TCLP results, as well as other hot spot sampling results, are shown in Table 3-6. As part of the review comments on the interim confirmation report for IR Site 1E (SWDIV, 2000a), the hot spot issue was discussed again in the 62nd FFA meeting held on November 21, 2000 (SWDIV, 2000b). The EPA representative suggested that additional soil samples be collected directly from grid location O12 to verify the level of contamination (EPA, 2000b). Three soil samples (including one duplicate) were collected on December 4, 2000. The sampling results indicated that the copper levels were within acceptable range and no removal action would be required.

3.4 Site Restoration Activities

Following the completion of the overexcavation, the site was winterized to protect the site from potential damages by adverse weather conditions during the winter of 1999. The site grade was partially restored to maintain positive drainage and all steep slopes were protected with a layer of premanufactured erosion control blanket. The final site grade was restored in December 2000. This section describes the winterization and restoration activities conducted following the overexcavation activities. Photographic documentation of the site restoration and winterization processes is presented in Appendix B.

3.4.1 Winterization

At the completion of overexcavation in November 1999, the site was winterized awaiting decisions on final site restoration. The winterization effort was performed in December 1999, which included the installation of straw bales and silt fence along the top and bottom of the slopes and along drainage swales to reduce the impact of erosion and sedimentation caused by

the anticipated winter rains. The entire excavation area, except the canyon floor, was covered with premanufactured erosion control blankets made of wood fibers and fine mulch. Erosion control blankets have the ability to reduce raindrop impact and diminish runoff energy on steep slopes. As surface water drains down the slope, it will be slowed and desilted by these blankets. At the canyon floor straw bale barriers were installed at 100-foot intervals perpendicular to the flow line to further slow and divert surface water. Remaining surface water then passes through the perimeter silt fence installed during the construction phase prior to exiting the site. All drainage or erosion control devices were routinely inspected and maintained throughout the winterization period. The devices were inspected on a weekly basis and after each significant storm (i.e., more than 1-inch precipitation within any 24-hour duration).

The toad fences were maintained as part of the winterization effort. The fences were inspected on a weekly basis and after each significant storm to ensure that the fences stayed erected to prevent toads from entering the site. The presence of the toad was also monitored during the inspection. No toad activities were observed throughout the winterization period.

No vegetative restoration was performed as part of the 1999 winterization activities. The site was reseeded with native vegetation in the final site restoration process described in Section 3.4.2.

3.4.2 Restoration

The overexcavations along the eastern boundary along MACS Road created a nearly vertical cut wall that required backfilling to maintain the stability of MACS Road. In December 1999, the cut area (Figure 3-6) was backfilled with clean soil. The backfill was placed in 12-inch lifts and compacted to at least 90 percent of the maximum dry density. A geotechnical technician was on site verifying the compaction effort. The field density test results are provided in Appendix C. A total of 4,914 cubic yards of material was placed during the structural fill activities. Photographs of the grading operation are shown in Appendix B.

The final site restoration plan was presented in the interim confirmation report (SWDIV, 2000a) and discussed during the 62nd FFA meetings held on November 21, 2000 (SWDIV, 2000b). After the hot spot sampling data (see discussions in Section 3.3.3) indicated that the remedial excavation met the cleanup standards, the site restoration plan was implemented between December 18, 2000 and January 12, 2001. Clean soil was imported from a borrow site located in 22 Area of the Base (Figure 1-2) to restore the surface grade for better drainage management and erosion protection. The burn pit area was regraded with about 2 feet of clean soil to support the growth of native vegetation. An erosion control blanket was then installed to cover the backfill

area (see Appendix B for photographs of as-built condition). Because the backfill was to support vegetation growth, it was not compacted as structural fill. The final surface was scarified and loosened to promote better vegetation growth. A rip-rap downdrain was constructed as shown in Figure 3-6 to drain the entire site into the ravine.

The final site grade is shown in the as-built topography map presented in Figure 3-6. The site was seeded, during December 2000, with a mix of native plants that was approved by the Base biologist and the U.S. Natural Resources Conservation Service. The seed mix specification is presented in Appendix D.

4.0 Performance Standards and Construction Quality Control

Remedial actions taken at IR Site 1E must include the following based on the OU3 ROD (SWDIV, 1999a):

- Excavation of contaminated soils: The maximum excavation depths were 5 feet for ecological concerns and 10 feet for human health concerns.
- Confirmation sampling on the bottom and sidewalls of the excavation in accordance with EPA (1989) guidance.
- Transportation and disposal of soil meeting the technical and legal requirements (i.e., specified in 40 CFR 264.552[c]) at an on-Base landfill (IR Site 7 – Box Canyon Landfill), a designated CAMU.
- Backfilling of the excavation with clean soil upon confirmation that cleanup goals were met; if goals were not met at the maximum excavation depths (i.e., 5 feet for ecological concerns and 10 feet for human health concerns), 5 or 10 feet of clean fill was placed, as appropriate.
- Site regrading and revegetating.

The RD/RA work plan (SWDIV, 1999b) was developed to establish specific methodology and performance standards for meeting each of the above requirements. This section provides a review of actions taken to meet each of the OU3 ROD requirements listed above in terms of performance or quality standards specified in the RD/RA work plan.

4.1 Excavation of Contaminated Soil

The remedial excavation was conducted in accordance with the RA excavation plan decision tree (Figure 2-3). The excavation strategy was to minimize the excavation depth while meeting the remedial objectives. In the area where the remedial goal was to remove contaminants to eliminate ecological risk, and exposure risk to human health was not a concern, the maximum initial excavation depth was 5 feet below ground surface. The same strategy applied for the removal of contaminants posing risk to human health exposure. In the latter case, the maximum initial excavation depth was 10 feet below ground surface. If the contamination could not be fully removed at the maximum initial excavation depth, further remedial activities, including limited hot spot removal or effective remedial backfill, would then be implemented as required to remediate the site.

Surveyors maintained grid node locations and elevations throughout the excavation process. The "as-built" condition at the completion of the remedial excavation was surveyed on March 9,

2000, and is shown in Figure 4-1. The final site grade and the pre-excavation grade at each grid node are listed in Table 4-1. The excavation depth was determined when floor confirmation samples were collected. As shown in Table 4-1, the average excavation depth was about 8.1 feet. The extent of excavation was expanded from 0.43 to 3.5 acres as a result of extensive overexcavation to remove the contamination from the slope and ravine area.

4.2 Confirmation of Excavation Effectiveness

A sampling grid system and sampling strategy were developed in the RD/RA work plan based on EPA (1989) guidance for evaluating cleanup efforts. The data quality objectives (DQOs) of this sampling approach were met by achieving the following performance standards:

- Wall/perimeter confirmation samples were collected at intervals of 100 feet along the excavation boundary identified by the RI/FS process.
- Floor confirmation samples were collected in a systematic grid pattern with a randomly selected starting point.
- The grid spacing was designed to allow a 95 percent probability of detecting any residual hot spot with a radius larger or equal to 40 feet.
- The total number of samples satisfied the statistical test requirement for verifying that the decision error was within the tolerance (i.e., false positive rate of 5 percent and false negative rate of 20 percent). In addition, the minimum sample number was 20.

The size of the floor sampling grid was revised from 30 by 30 feet to 67 by 67 feet to accommodate the expansion of remedial excavation and to meet the DQOs. During the confirmation sampling process, a total of 49 floor grid locations within the excavation boundary were sampled along with 18 perimeter locations.

Throughout the RA process, a total of 26 perimeter samples was collected from 18 locations (9 locations along the planned excavation boundary and 9 points from the overexcavation) and 103 floor samples were collected from 49 grid points (22 points from the planned excavation and 27 points from the overexcavation). Only 79 of these samples were analyzed. The other samples were not tested primarily because a sample from the same sampling location indicated that the cleanup standard had already been achieved. The final excavation boundary, postexcavation site grade, and the final confirmation sampling locations are shown in Figure 4-1.

All confirmation samples were collected, preserved (only as required), shipped, and analyzed in accordance with the field sampling plan presented in the work plan (SWDIV, 1999b). The analytical data summary, chain-of-custody forms, and data validation summary report are

presented in Appendix E. The original laboratory data reports and data validation details are too voluminous to be included in this report. The data are maintained by the Navy administrative record archive and are available for review upon request.

In accordance with DQOs presented in the work plan, the primary criterion for confirming that the cleanup standards had been achieved was that the UCL_{95} for the confirmation sample mean was equal to or less than the specific cleanup standard. The UCL_{95} was calculated and updated continuously, during the remedial excavation process whenever new confirmation sampling data were added to the database. The calculated UCL_{95} was compared against the remedial standards for the excavation depth until the cleanup standard was met.

The results of final UCL_{95} computation and the associated perimeter and floor confirmation sampling results that were used for the final UCL_{95} computation are presented in Tables 4-2 and 4-3, respectively. The following additional information is also provided in the tables:

- Grid location – the node identifier represented by an alphanumeric designation
- Sample location number – the number assigned to each sample, identifying the site number, grid location, and the sequential number of samples collected at the grid location
- Sample depth – the depth below ground surface from which the sample was collected
- Collection date – the date the sample was collected
- The calculated mean, standard deviation, and UCL_{95}.

The final UCL_{95} data indicated that, with the exception of iron level in floor samples, the remedial excavation successfully met the cleanup standards for all COCs and the statistical DQO criteria. In addition, the UCL_{95} was below the most stringent cleanup standard; as such, the site could be restored and backfilled without any thickness limitation other than to support future vegetation and drainage control. The levels of some isolated residual contamination were at such a level that it should not pose any significant risk to human health or the surrounding environment.

Variance to Iron Cleanup Standard. The residual iron concentration at IR Site 1A and 2A and the iron cleanup standard were discussed in the 52nd FFA meeting held on November 8, 1999 (SWDIV, 1999d and DTSC, 1999). It was decided that iron is an acute toxic element to the environment and; therefore, the cleanup standard should be used in a less restrictive manner. The UCL_{95} of iron concentrations from the floor samples (Table 4-3) at IR Site 1E

(29,032 mg/kg) was slightly higher than the iron cleanup standard (26,495 mg/kg). The iron cleanup standard was established primarily for the protection of ecological receptors. The cleanup standard was based on the background concentration because the calculated/theoretical concentration for protection of ecological receptors is lower than the background concentration. The background level for IR Site 1E was based on general soil data for the Santa Margarita River basin (about 1 mile east of IR Site 1E) and not site-specific. Considering that UCL_{95} of iron concentrations from the final floor confirmation data was within 15 percent of the cleanup standards and that the cleanup standard is background-based, the residual iron concentration should not pose any significant risk to the surrounding environment. The above justification was the same as the variance approved by the FFA team (DTSC, 1999) to the iron cleanup standard at IR Site 1A and 2A. The residual iron level was, therefore, deemed acceptable and no additional cleanup effort for iron would be required.

4.3 Waste Transportation and Disposal Activities

Excavated waste and contaminated soil were transported with end-dump trucks to the CAMU at IR Site 7 (Box Canyon Landfill) for final disposal. Signs identifying the trucking route were installed at all major road crossings. All trucks were required to use tarps to cover the waste. No trucks were allowed to leave the site without proper tarp covers. The trucking route was maintained free of contamination at all times. A separate decontamination area was maintained at the site to clean the tires and other exterior surfaces of any transfer trucks, if necessary, prior to leaving the site.

The remedial excavation at IR Site 1E was initiated on August 18, 1999. Between July 18 and November 19, 1999, 4,545 truckloads (Table 3-3) were recorded. Each truckload was about 20 tons in weight, or 13 cubic yards in volume. Therefore, the estimated volume of waste excavated was 59,085 cubic yards. The work plan had estimated a total of 2,078 cubic yards. The actual excavation was much deeper (Table 4-1) and larger (Figure 4-1) than planned. Throughout the transportation and disposal activities, no traffic accidents or violations were recorded. The trucker's daily log/ticket was used as a proof of loads and showed the starting and ending time for each load during each day.

4.4 Site Backfilling and Restoration Activities

The effectiveness of the remedial excavation was evaluated in accordance with the EPA guidance (1989). The evaluation (Section 4.2) confirmed that the soil contamination at IR Site 1E has been remediated to meet the cleanup standards stipulated in the OU3 ROD. As such, the site no longer posed a threat to the surrounding environment or human health. In accordance

with the work plan, the site grade was restored, as required, to promote drainage and support vegetation growth. The backfill soil was compacted in 1-foot lifts. The goal of the compaction effort was to achieve 90-percent maximum density, as determined by American Society for Testing and Materials (ASTM) D 1557. The compaction effort was verified by field QC testing, as specified in the work plan. All the slope areas were also covered by erosion control blankets to prevent the bare slopes from erosion damages.

The final site restoration was conducted between December 18, 2000 and January 12, 2001. The site drainage pattern was restored to match preexcavation conditions. The surface layer was then scarified and loosened to enhance revegetation growth.

The site was seeded during December 2000, with a mix of native plants approved by the Base biologist and the U.S. Natural Resources Conservation Service. The seed mix specification is presented in Appendix D.

5.0 Final Inspection and Certification

The final remedial action at IR Site 1E was implemented in accordance with the RD/RA work plan (SWDIV, 1999b), which was specifically developed to meet the OU3 ROD (SWDIV, 1999a). The remedial actions were performed in the following sequence:

- Site preparation: August 9 through 17, 1999
- Remedial excavation: August 18 through November 19, 1999
- Transportation and disposal of excavated wastes: August 24 through November 19, 1999
- Interim confirmation report and site restoration plan (SWDIV, 2000a): October 19, 2000
- Site restoration plan approved: November 21, 2000 (during 62nd FFA meeting)
- Site restoration backfill: December 18, 2000 through January 12, 2001
- Site revegetation (hydroseeding): December 2000.

Parties to the FFA during the RA, visited the site on August 20, 1999 (as part of 51st FFA meeting), and observed the remedial excavation, transportation, and the CAMU disposal activities. The status of the RA was presented and discussed in FFA meetings subsequent to the start of the fieldwork. This included interim confirmation data analysis, excavation boundary changes (both horizontal and vertical extent), and production quantities. The final extent of the excavation indicated that it was, on the average, about 8.1 feet deep and 3 acres larger than the original plan. The total excavated quantity was about 57,008 cubic yards more than originally estimated (2,078 cubic yards).

A draft version of this RA site closure report (SWDIV, 2003) was submitted to and reviewed by the parties to the FFA for final concurrence on the effectiveness of the site remediation. A copy of the FFA member review comments is provided in Appendix F, which serves as the final inspection and certification of the RA at IR Site 1E.

6.0 Operation and Maintenance Activities

IR Site 1E has been remediated in accordance with the RD/RA work plan to meet the cleanup standards stipulated in the OU3 ROD. The site no longer poses a threat to human health or the surrounding environment. The site grade was restored and site vegetation was reintroduced during December 2000. No specific long-term postclosure operation, monitoring, or maintenance is needed. IR Site 1E is considered a clean closure; consequently, 5-year reviews are not required at this site.

7.0 Summary of Project Costs

The project cost was estimated to be $0.1 million in the OU3 ROD. The actual cost was about $1,362,000. The breakdown of the actual cost is as follows:

Remedial Action Activities	Total Cost
RD/RA work plan, study, engineering planning	$65,000
Site preparation and clearing	$20,000
Remedial excavation	$288,000
Transportation of excavated wastes	$255,000
Disposal of excavated wastes at CAMU	$181,000
Confirmation sampling and survey control	$85,000
Site backfill and grade restoration	$118,000
Site revegetation and erosion control	$110,000
Construction engineering monitoring	$65,000
Construction management	$110,000
Miscellaneous costs (5%)	$65,000
Subtotal	$1,362,000

It should be noted that the above total cost does not include the cost associated with the closure of the CAMU at IR Site 7.

8.0 References

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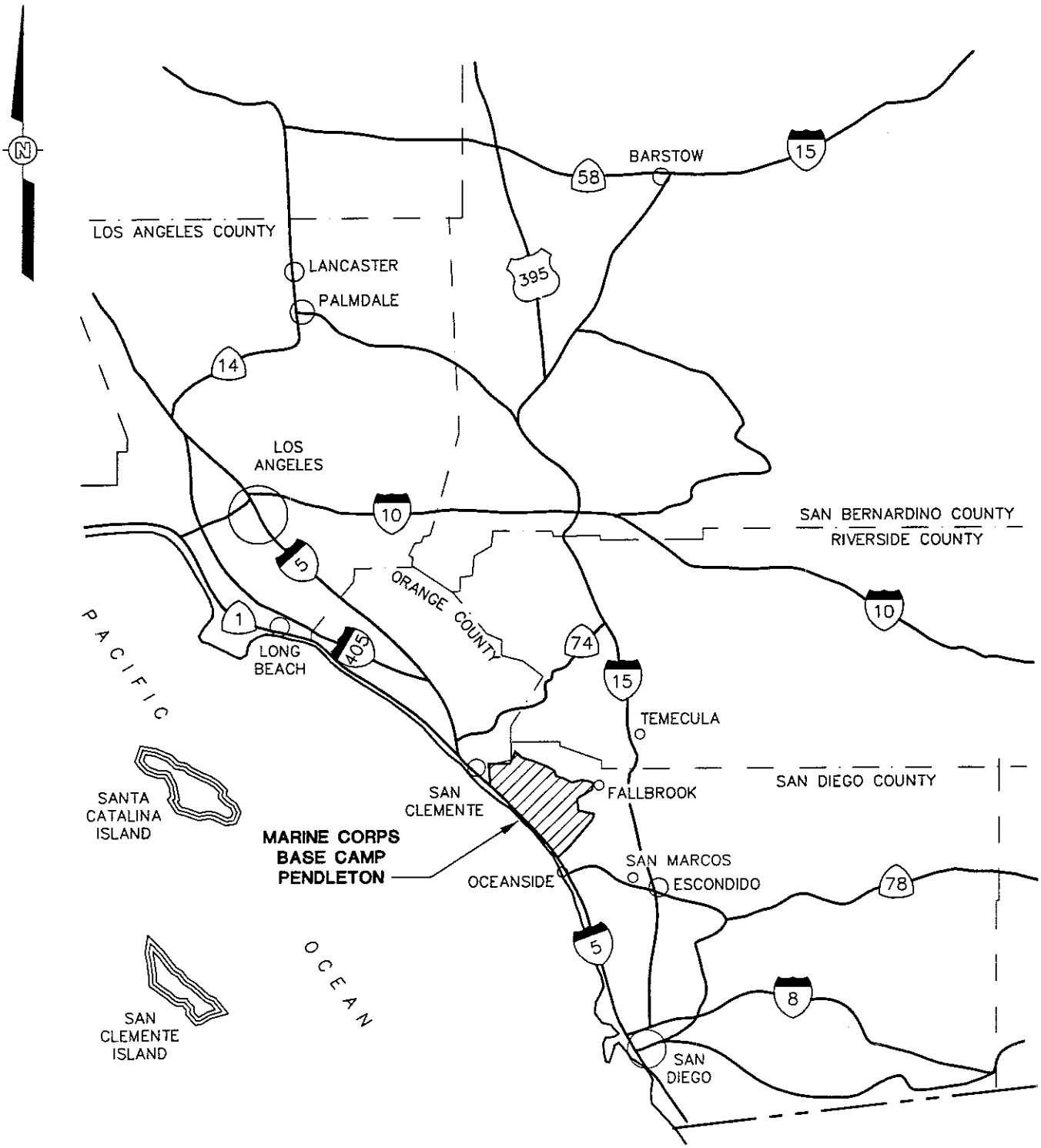
FIGURES



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J. VASQUEZ 02/12/03	22403	2/25/03	829771-A2

IT CORPORATION

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 1-1

BASE LOCATION MAP

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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N

SAN MATEO CREEK

NORTH FORK SAN ONOFRE CREEK

SOUTH FORK SAN ONOFRE CREEK

BASILONE ROAD

DE LUZ CREEK

O'NEILL LAKE

SAN CLEMENTE

PULGAS ROAD

PULGAS CREEK

ALISO CREEK

LAS

BACKFILL BORROW PIT

SANTA MARGARITA RIVER

BOULEVARD

VANDEGRIFT

WINDMILL LAKE

PACIFIC OCEAN

IR SITE 1E

STUART MESA ROAD

IR SITE 7 (CAMU) BOX CANYON LANDFILL

CITY OF OCEANSIDE

EXPLANATION:

- MAJOR AREA BOUNDARIES
- ROADS AND HIGHWAYS
- CREEKS AND STREAMS
- MCB CAMP PENDLETON BOUNDARY
- (53) OPERATION AREA DESIGNATION
- IR SITE 1E ■ REMEDIAL ACTION SITE LOCATION

SCALE

0 8000 16000 FEET

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EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 1-2

REMEDIAL ACTION SITE LOCATIONS

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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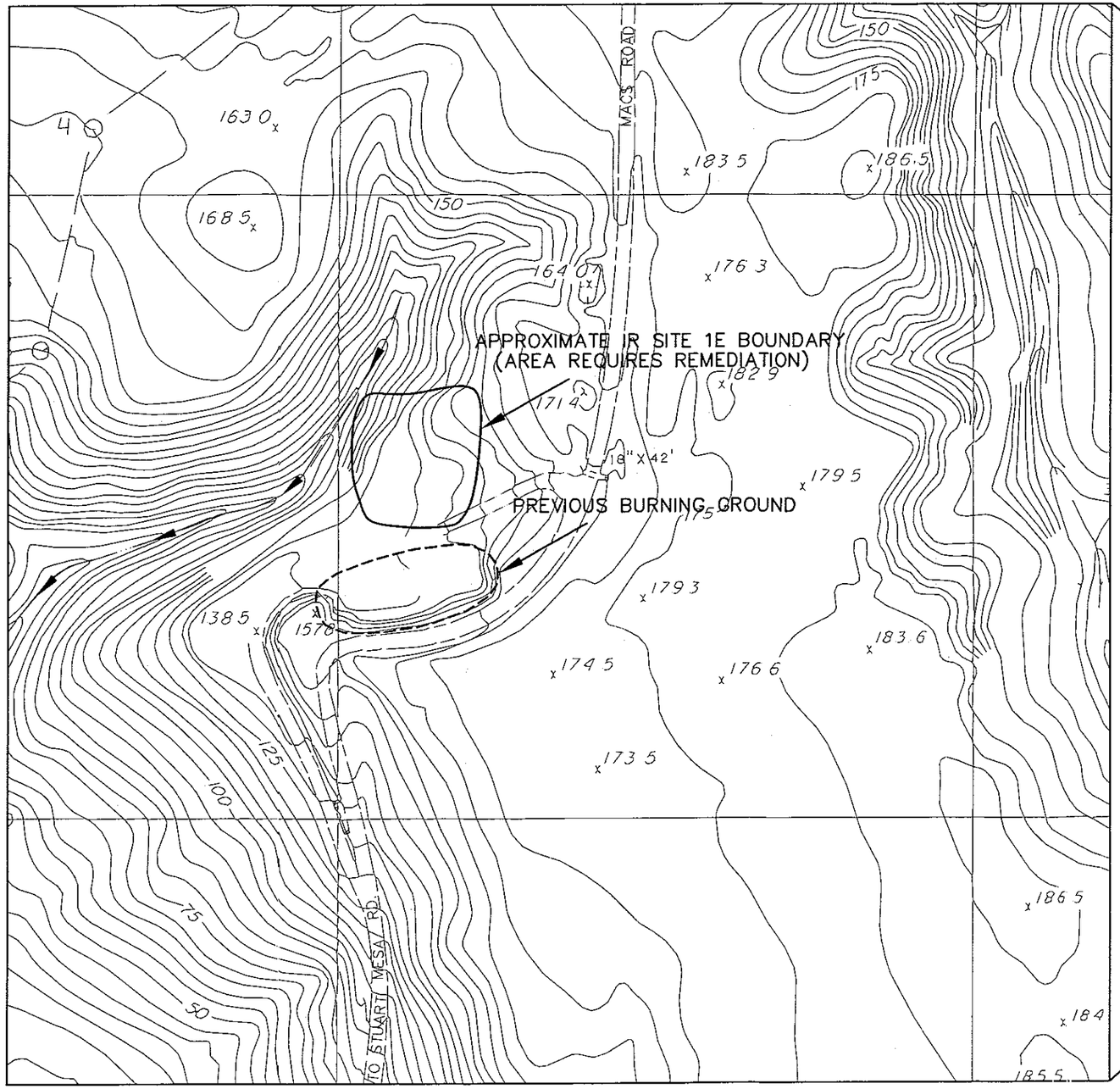

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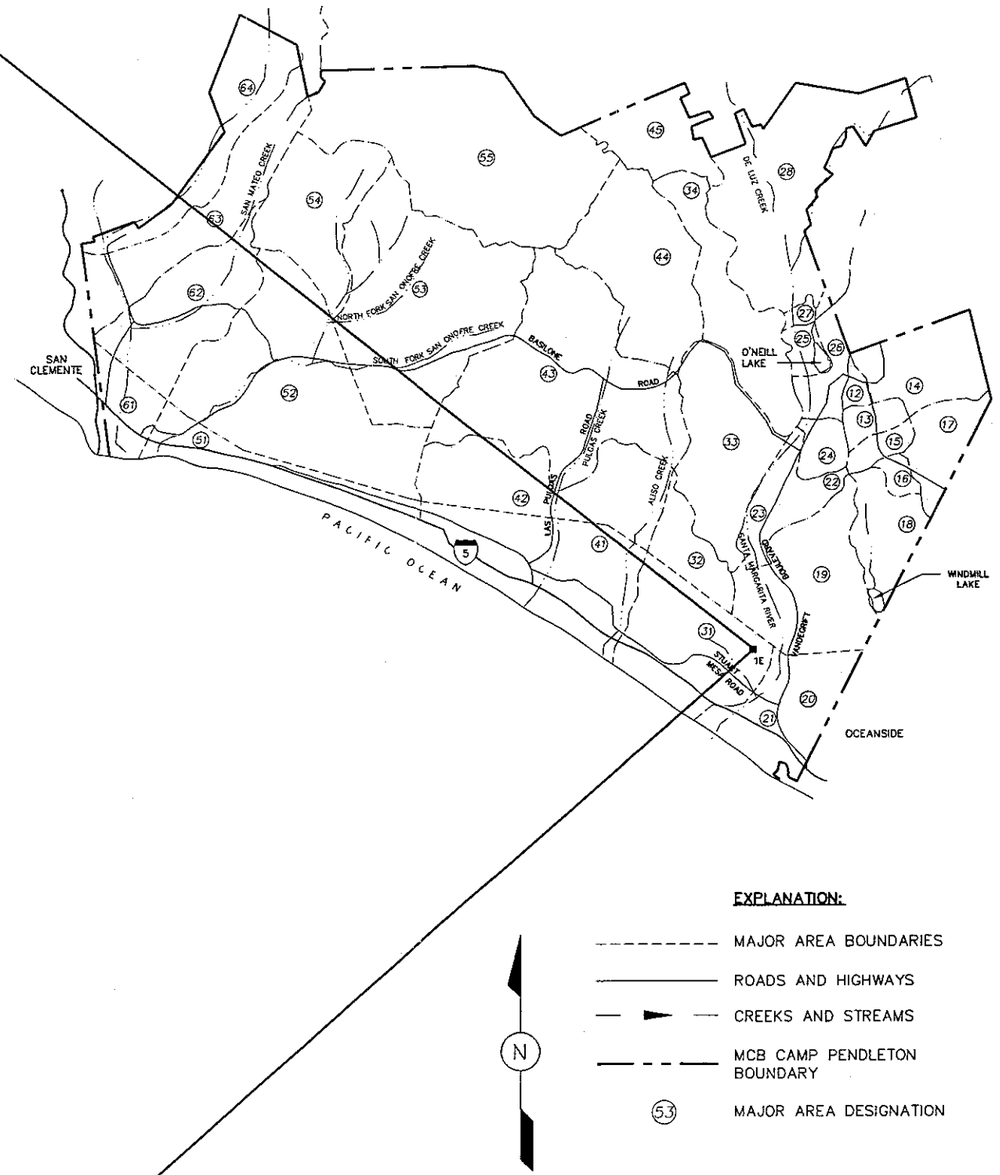

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAP 6C
DATE: DECEMBER 1987

IT CORPORATION

EFA WEST
CAMP PENDLETON CALIFORNIA

FIGURE 2-1

IR SITE IE LOCATION MAP

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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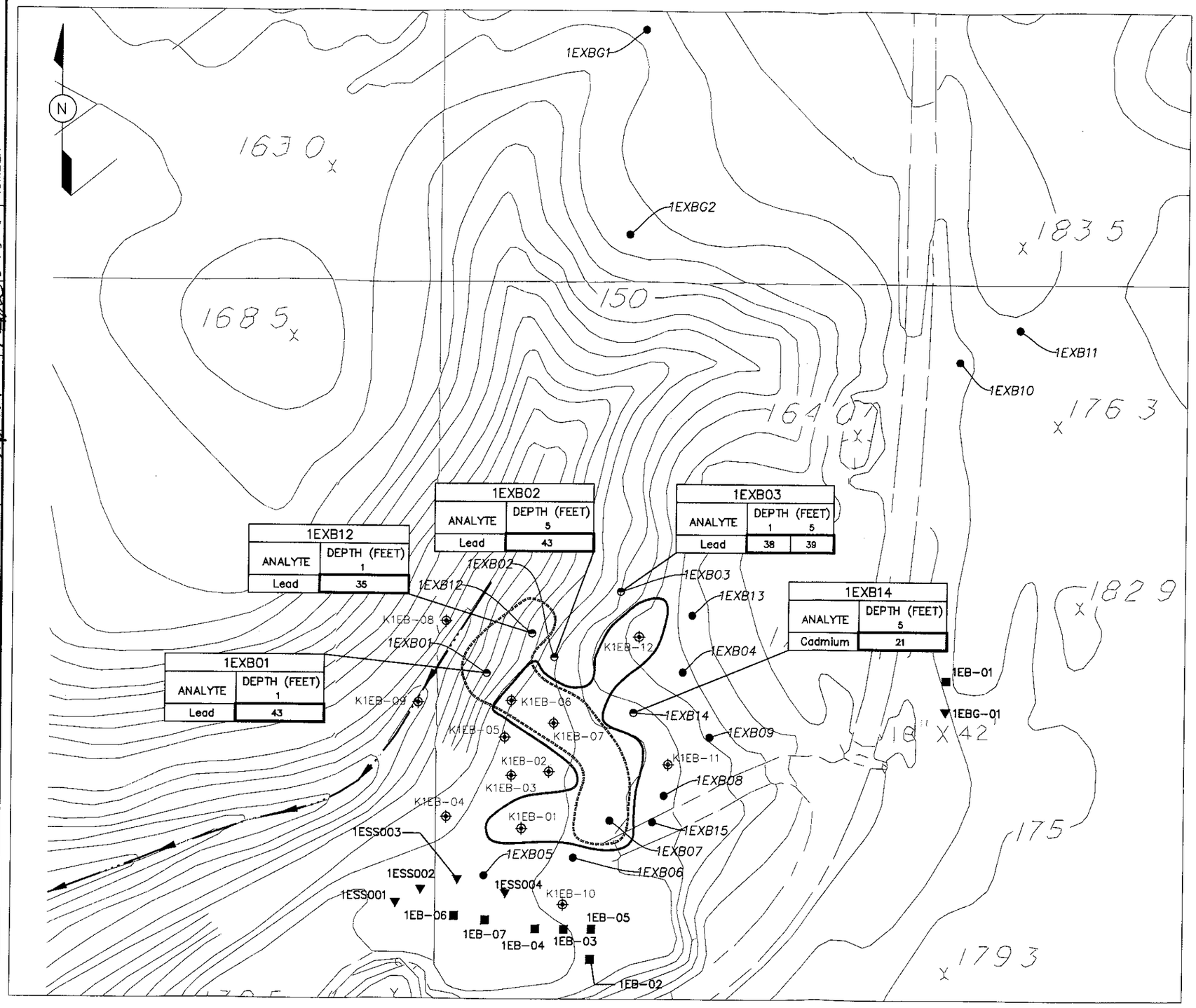

1EXB02	
ANALYTE	DEPTH (FEET) 5
Lead	43

1EXB03		
ANALYTE	DEPTH (FEET) 1	5
Lead	38	39

1EXB12	
ANALYTE	DEPTH (FEET) 1
Lead	35

1EXB01	
ANALYTE	DEPTH (FEET) 1
Lead	43

1EXB14	
ANALYTE	DEPTH (FEET) 5
Cadmium	21

REFERENCE:
"ENERGY DISPERSIVE X-RAY FLUORESCENCE FIELD INVESTIGATION, SITES 1A, 1D, 1E, 1F, 2A AND 30, MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA", PREPARED BY IT CORP

EXPLANATION:

- 1EXB11 ● XRF BORING WITH SLIGHT EXCEEDANCE OF
- 1EXB02 ◓ XRF BORING LOCATION XRF-BASED COMPARISON LEVEL
- K1EB-06 ⊕ EE/CA BORING LOCATION
- 1ESS003 ▼ RI SURFACE SOIL SAMPLE
- 1EB-02 ■ RI BOREHOLE LOCATION
- SURFACE-WATER FLOW DIRECTION (EPHEMERAL)
- SITE BOUNDARY – XRF
- DEBRIS NOTED IN BORING LOGS

ANALYTE	XRF-BASED COMPARISON LEVEL (mg/kg)	FS REMEDIAL GOAL (mg/kg)
CADMIUM	9	9
LEAD	30	29

NOTES:

1 CONCENTRATIONS IN BORINGS WHICH SLIGHTLY EXCEEDED XRF-BASED COMPARISON LEVEL BUT WERE EXCLUDED FROM EXTENT OF SITE BOUNDARY ARE SHOWN. ONLY ANALYTES AND DEPTHS WITH EXCEEDANCES ARE SHOWN. BOLDED CELLS DENOTE CONCENTRATIONS THAT EXCEED XRF-BASED COMPARISON LEVEL.

2. XRF – X-RAY FLUORESCENCE

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 6C DATE: DECEMBER 1987

GRAPHIC SCALE
100 0 50 100
(IN FEET)

IT CORPORATION

EFA WEST
CAMP PENDLETON CALIFORNIA

FIGURE 2-2
ESTIMATED EXTENT OF CONTAMINATION IR SITE 1E
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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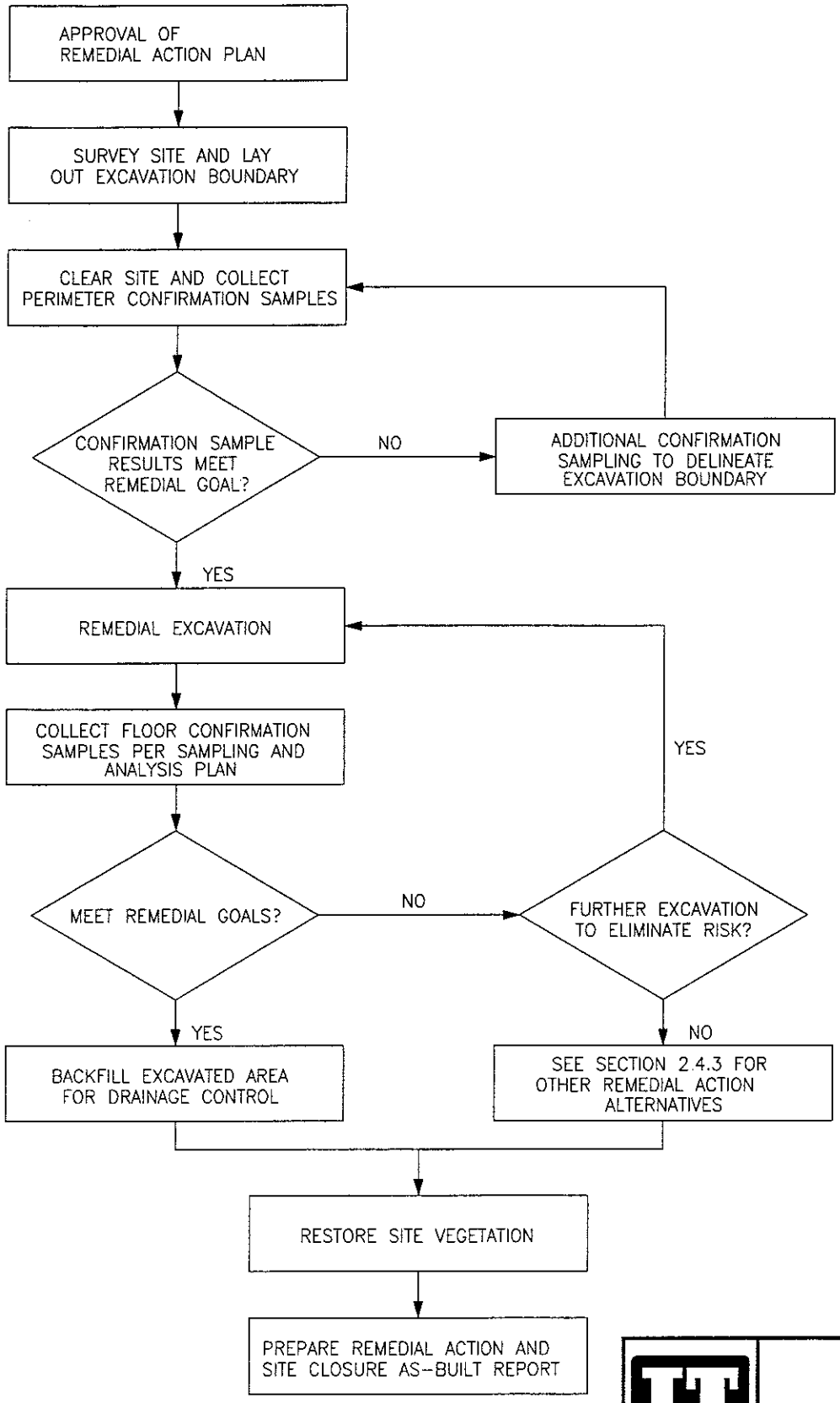

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IT CORPORATION

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-3

REMEDIAL ACTION PROCESS DIAGRAM

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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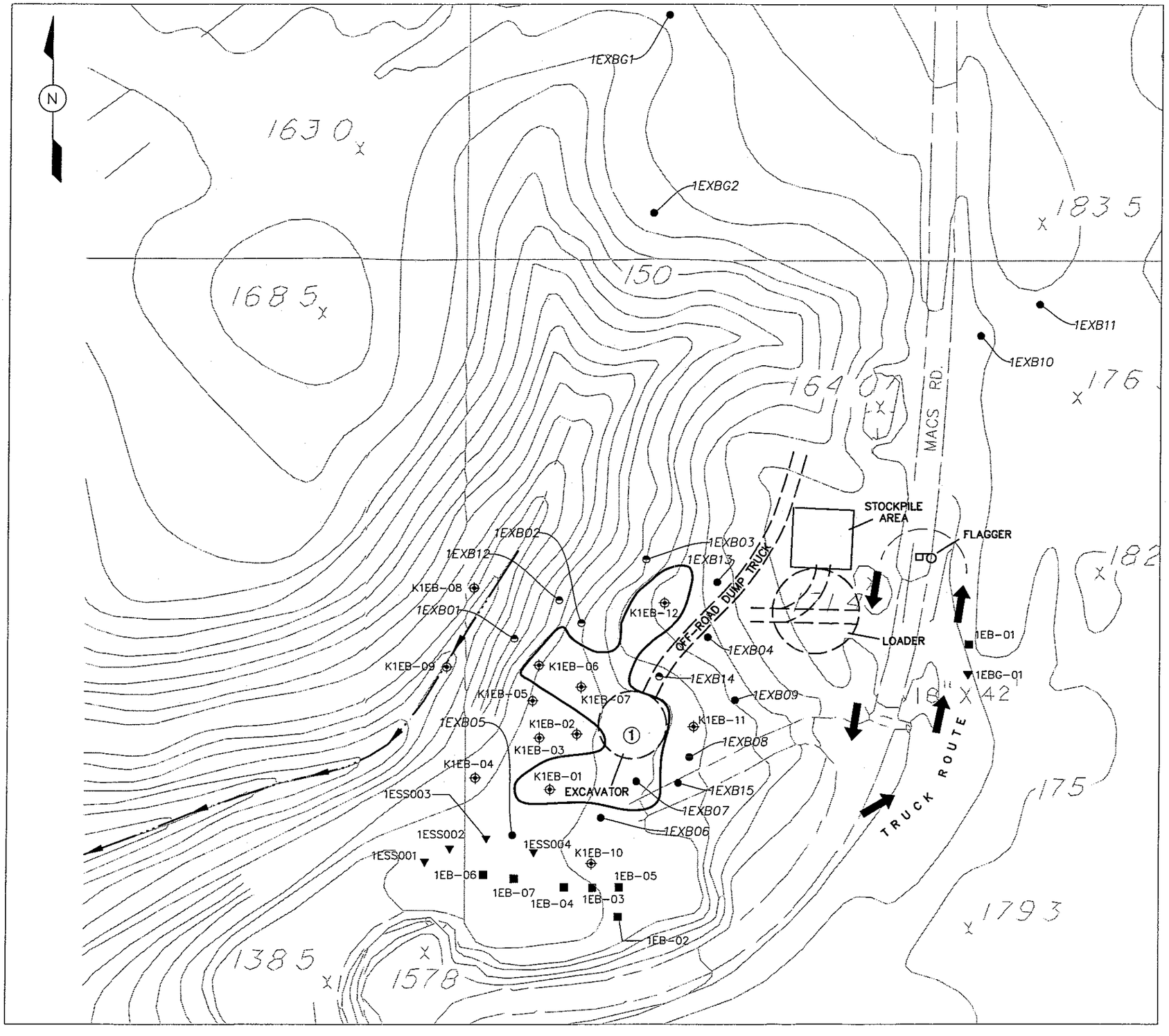

EXPLANATION:

AREA NO.	AREA (FT.^{2})	PLANNED EXCAVATION DEPTH (FT.)	ESTIMATED VOLUME (CY)
1	18,697 84	3	2,077.54

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 6C DATE: DECEMBER 1987

GRAPHIC SCALE
100 0 50 100
(IN FEET)

IT CORPORATION

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-4
PLANNED EXCAVATION BOUNDARY
IR SITE 1E
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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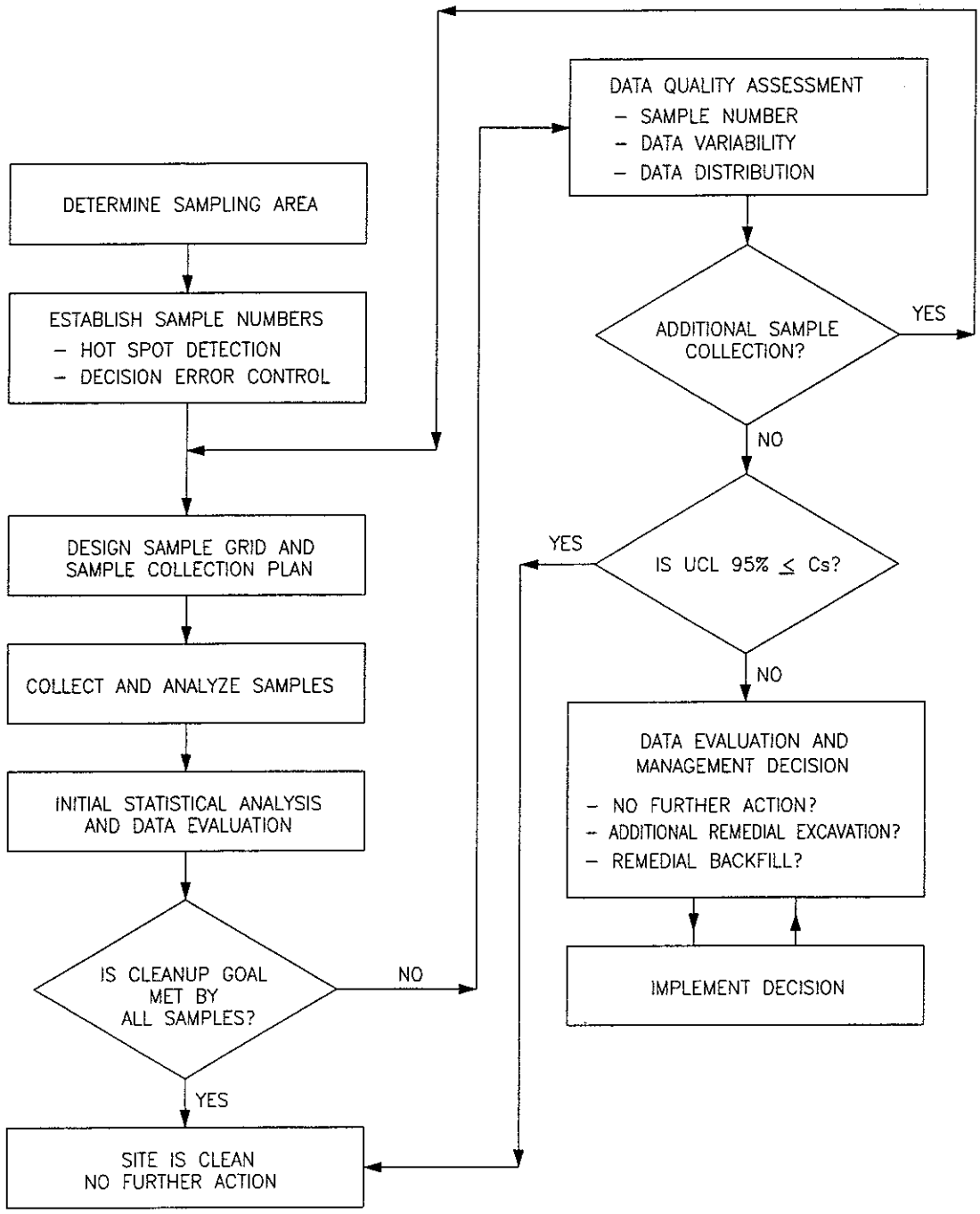

NOTE:
UCL 95% = UPPER 95% CONFIDENCE LIMIT OF MEAN
Cs = CLEANUP STANDARD

IT CORPORATION

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 2-5

CONFIRMATION SAMPLING DESIGN AND DATA EVALUATION PROCESS

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
J. VASQUEZ 02/13/03	2-24-03	2-25-03	829771-A4

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DRAWING NUMBER 8 771-B38

APPROVED BY 2-25-03

CHECKED BY 022403

DRAWN BY HDS 02-13

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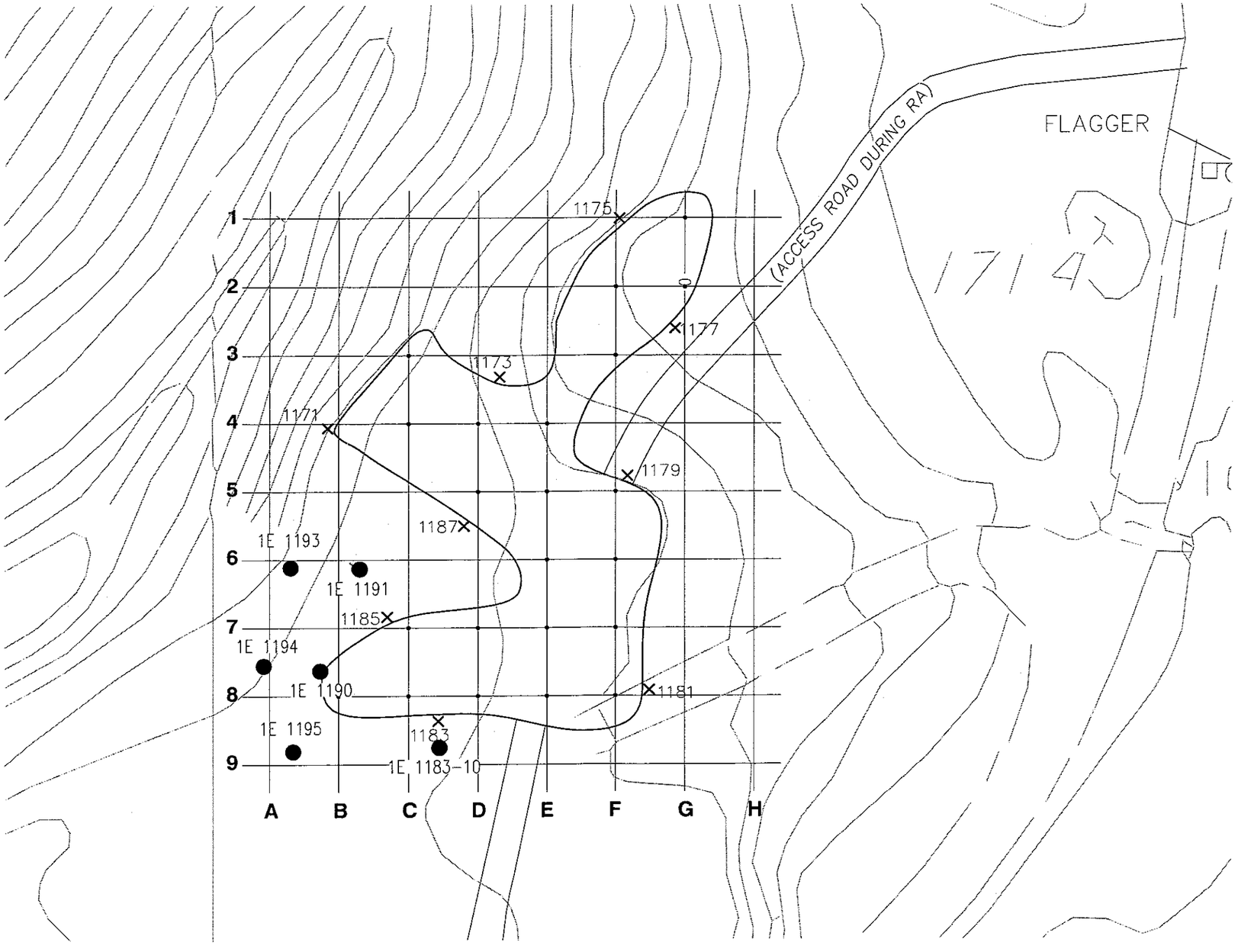

LEGEND:

- 1E 1183-10 — APPROXIMATE STEP-OUT SAMPLE LOCATION
- PLANNED EXCAVATION BOUNDARY
- FLOOR CONFIRMATION SAMPLING LOCATION
- 1133 × — PERIMETER SAMPLING LOCATION
- 300 — PRE EXCAVATION CONTOUR

GRAPHIC SCALE

50 0 25 50

(IN FEET)

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 24D. DATE: DECEMBER 1987

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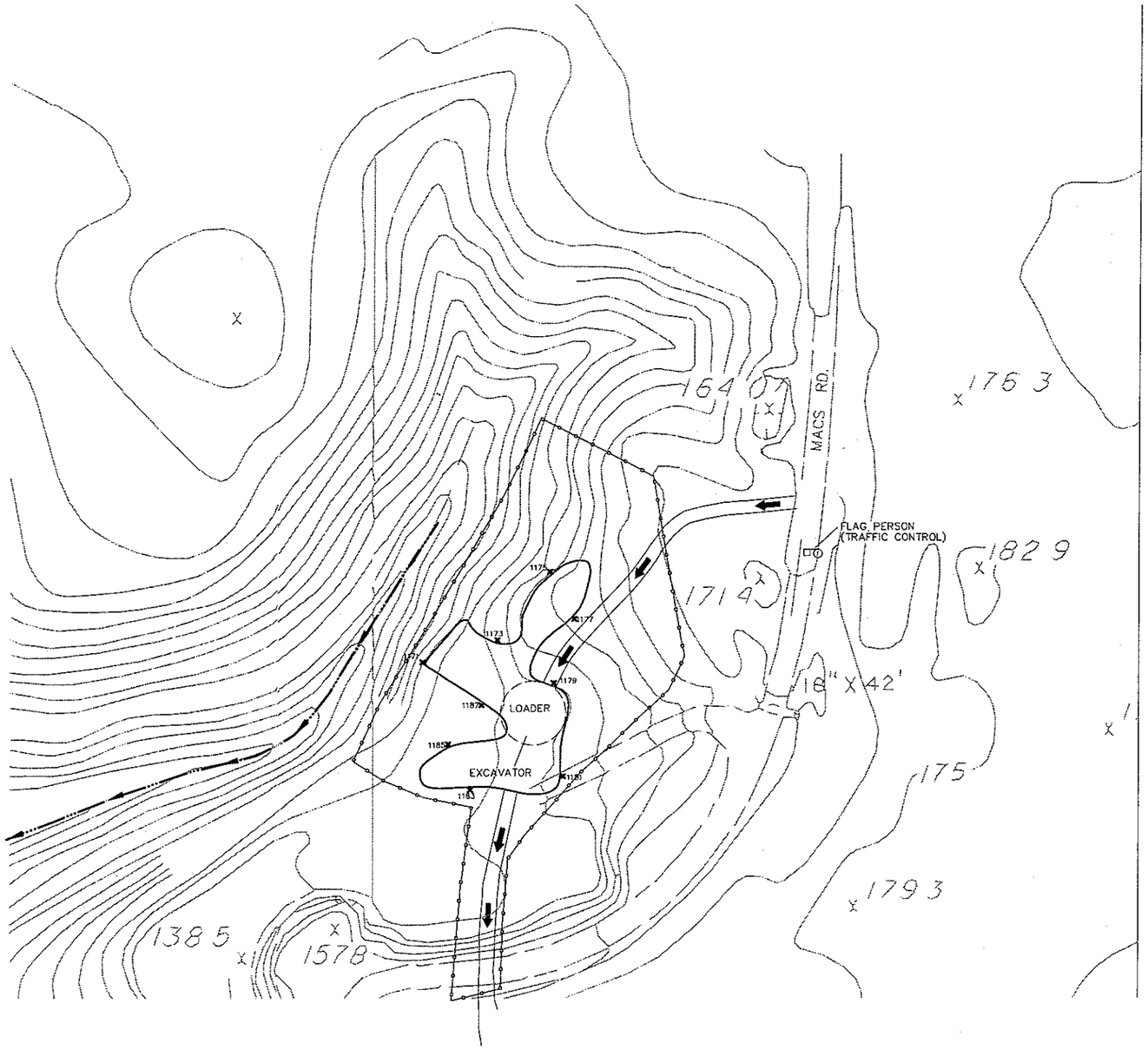
CAMP PENDLETON, CALIFORNIA

FIGURE 3-1
CONFIRMATION SAMPLING PLAN
IR SITE 1E

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
MB Miller 10-30-01	12/4/03	2-25-03	829.1-B39



AREA (FT^2)	PLANNED EXCAVATION DEPTH (FT)	ESTIMATED VOLUME (CY)
18,698	3	2,078

LEGEND:

- PLANNED EXCAVATION BOUNDARY
- SURFACE WATER DIRECTION FLOW (EPHEMERAL)
- TRUCK ROUTE DURING RA
- 1133 × PERIMETER SAMPLING LOCATION
- 300 PRE EXCAVATION CONTOUR
- TOAD FENCE

GRAPHIC SCALE

100 0 50 100

(IN FEET)

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 24D. DATE: DECEMBER 1987

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CAMP PENDLETON, CALIFORNIA

FIGURE 3-2

SITE PLAN AND PLANNED EXCAVATION BOUNDARY IR SITE 1E

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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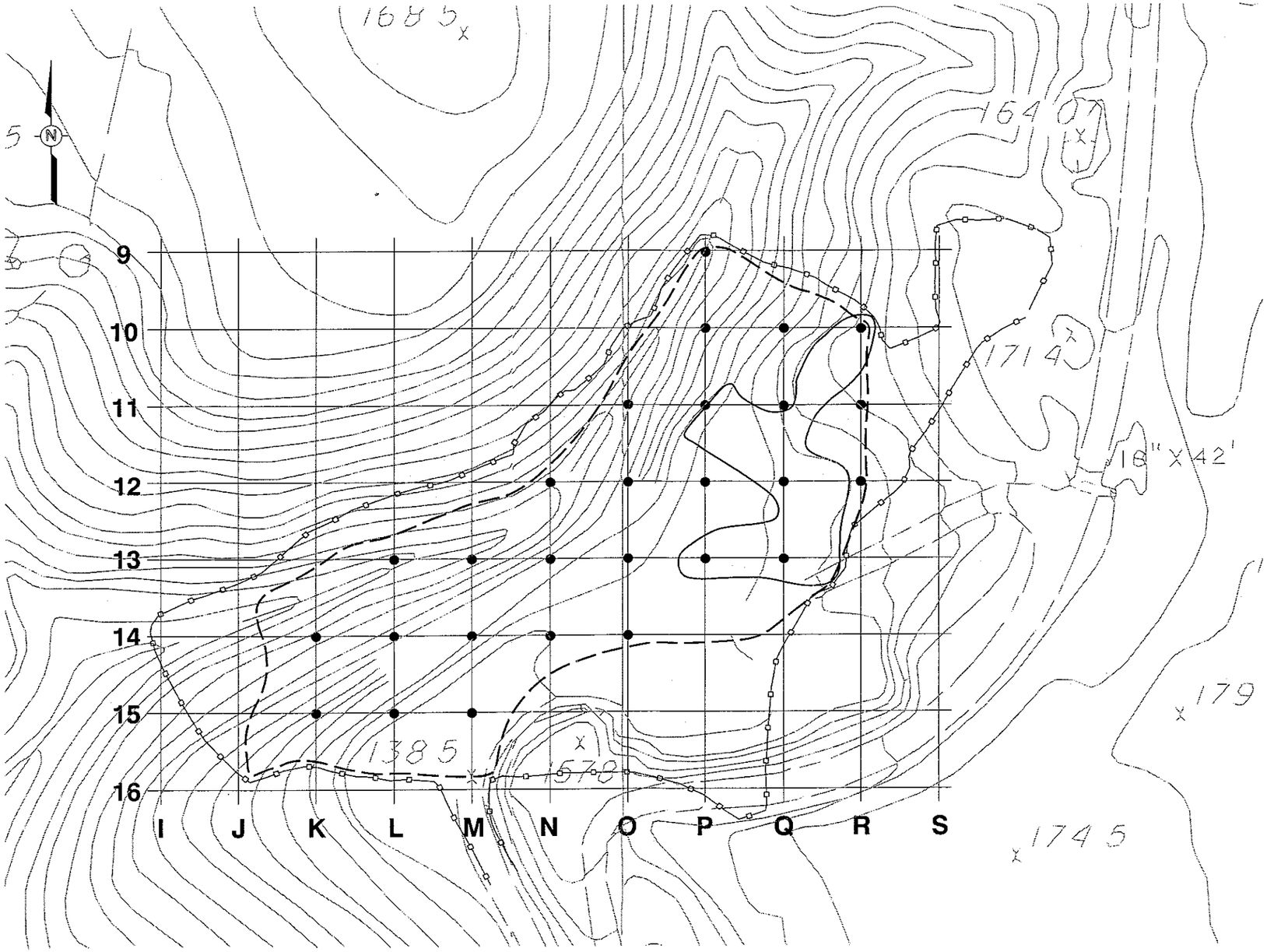
APPROVED BY [signature] 2-25-03

CHECKED BY [signature] 02/24/03

DRAWN BY HDS 02-13-03



LEGEND:

- SILT/TOAD FENCE
- PLANNED EXCAVATION BOUNDARY
- LIMITS OF OVER-EXCAVATION
- FLOOR CONFIRMATION SAMPLING LOCATION
- 300 PRE EXCAVATION CONTOUR

NOTE:

SILT/TOAD FENCE IDENTIFIES THE SITE BOUNDARY, NOT THE EXCAVATION BOUNDARY

GRAPHIC SCALE

100 0 50 100

(IN FEET)

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 24D. DATE: DECEMBER 1987

IT CORPORATION

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CAMP PENDLETON, CALIFORNIA

FIGURE 3-3
REVISED CONFIRMATION SAMPLING GRID AND EXCAVATION BOUNDARY IR SITE 1E
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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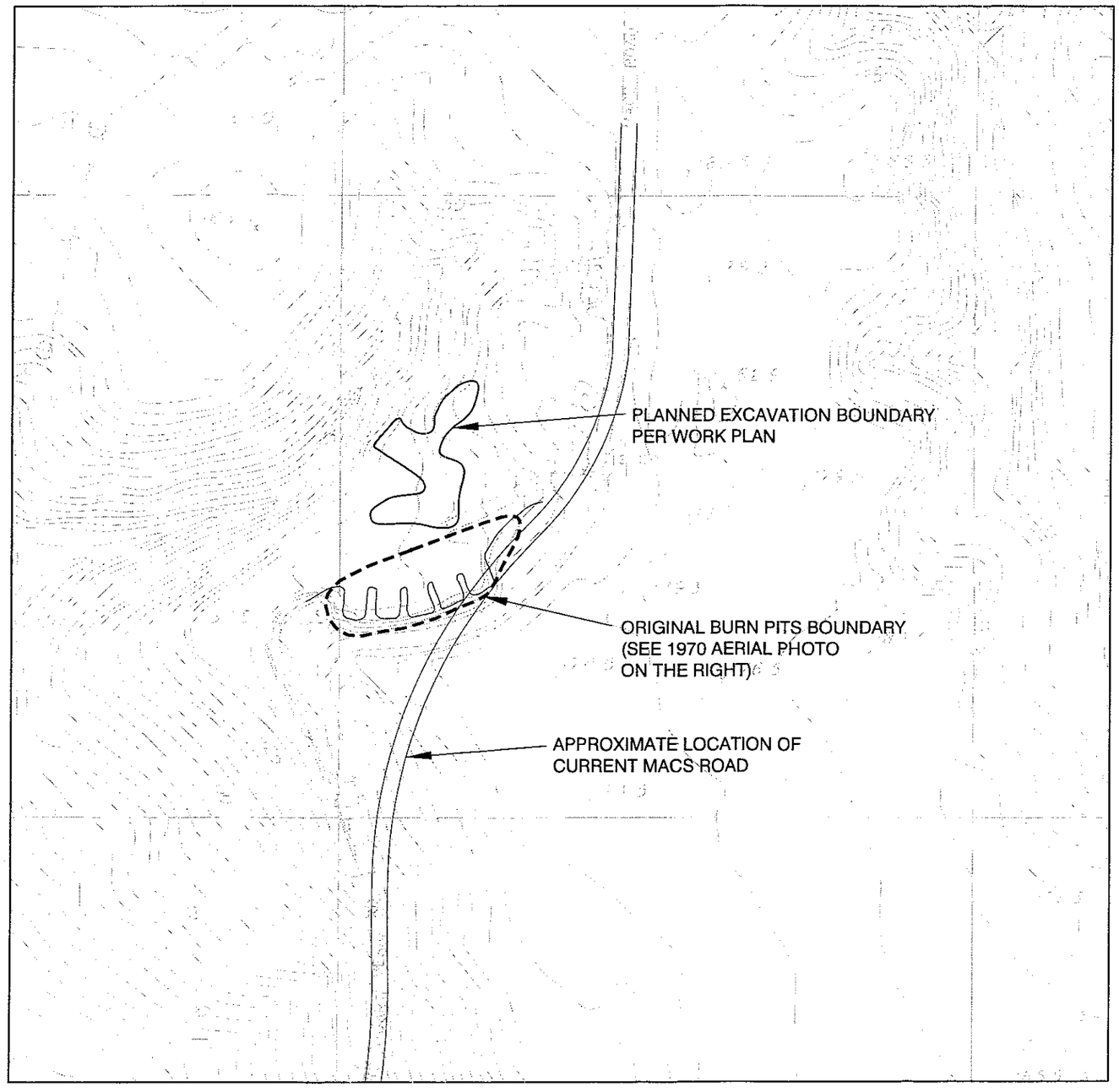

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAP 24D
DATE: DECEMBER 1987

SCALE
0 200 400 FEET

AERIAL PHOTO DATE: 2/18/1970

NOT TO SCALE

IT CORPORATION

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CAMP PENDLETON CALIFORNIA

FIGURE 3-4
HISTORIC SITE CONDTION
IR SITE 1E

MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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DRAWING NUMBER	APPROVED BY	CHECKED BY
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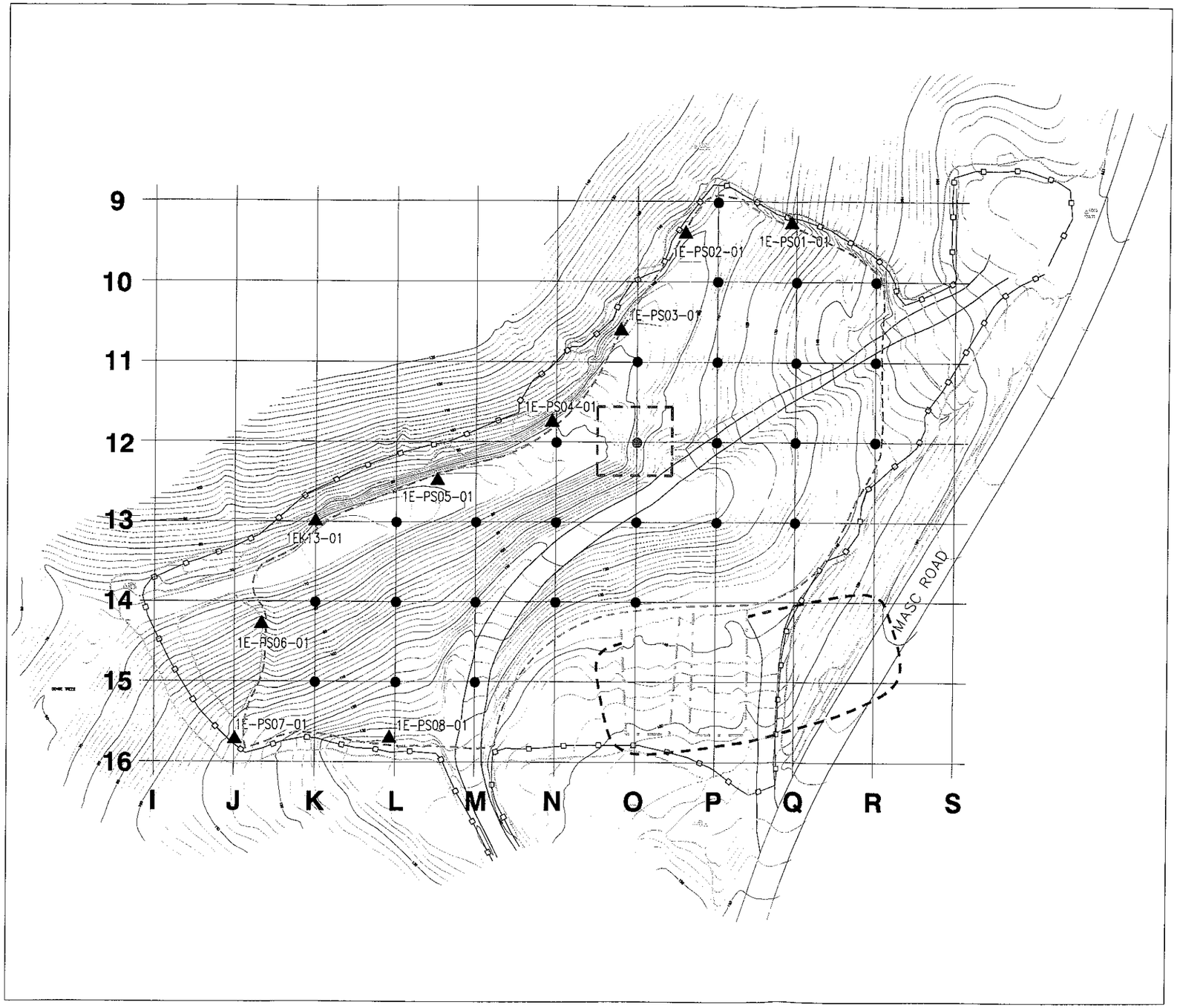
DRAWN BY: HDS 02-23-03



LEGEND:

- ▲ 1E-PS05-01 APPROXIMATE LOCATION OF ADDITIONAL PERIMETER CONFIRMATION SAMPLE
- SILT/TOAD FENCE
- LIMITS OF OVER-EXCAVATION
- FLOOR CONFIRMATION SAMPLING LOCATION
- 300 POST-EXCAVATION CONTOUR
- ADDITIONAL HOT SPOT SAMPLING AREA
- APPROXIMATE BURN PIT LOCATION
- TRENCH LOCATION

GRAPHIC SCALE

80 0 40 80

(IN FEET)

TOPOGRAPHIC REFERENCE:

AERIAL TOPO BY CALVADA SURVEYING INC
108 BUSINESS CENTER DRIVE, CORONA, CA 92880-1782
PHONE: (909) 280-9960
BASED ON U.S.G.S. MONUMENT F 131, ELEC = 28 82 (NAVD 88)
AERIAL SURVEY DATE: MARCH 9, 2000

IT CORPORATION

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 3-5
FINAL CONFIRMATION SAMPLING LOCATIONS IR SITE 1E
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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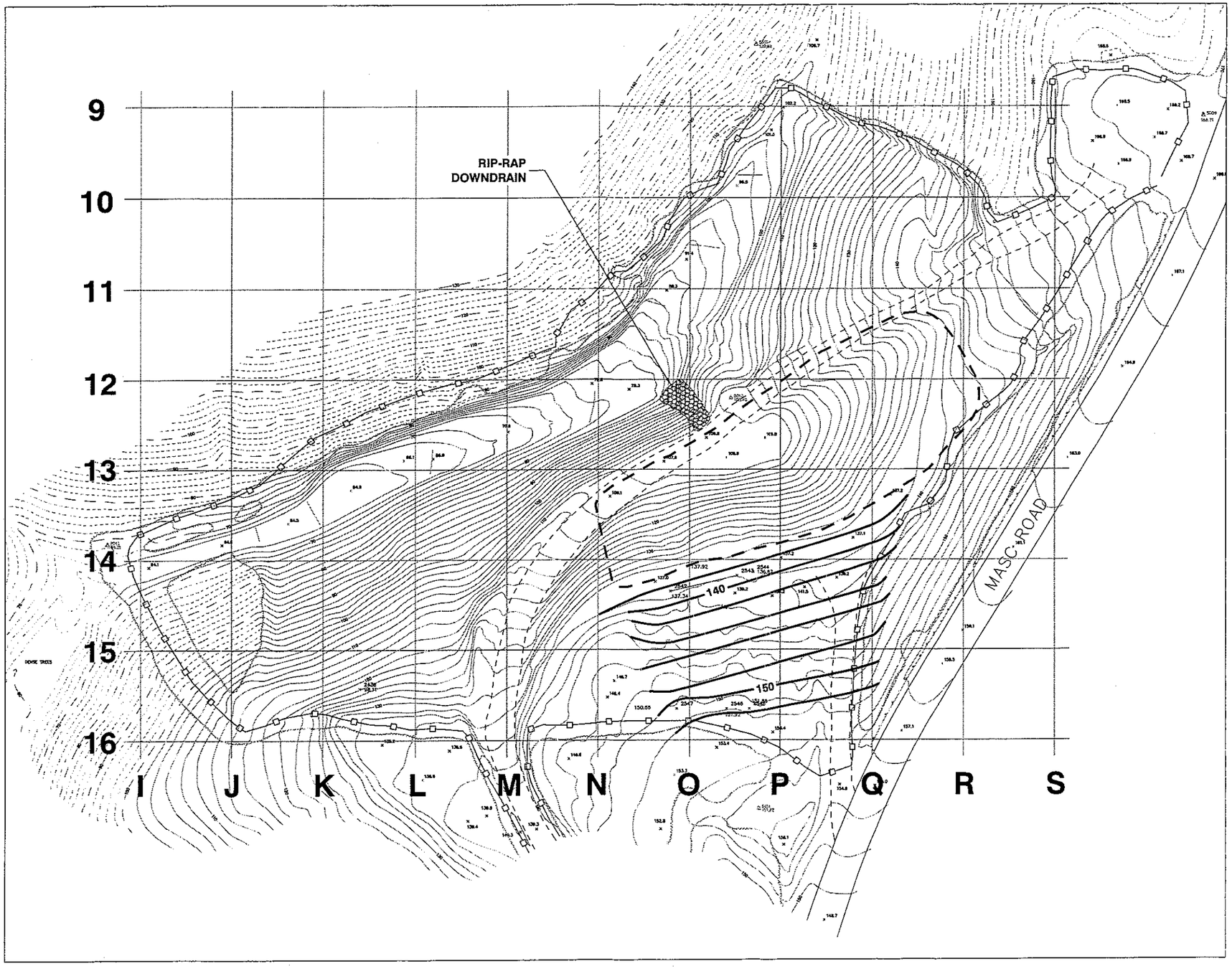

LEGEND:

- 160 — FINAL CONTOUR OF EXCAVATED SITE
- 140 — FINAL RESTORED GRADE IN BURN PIT AREA
- SILT/TOAD FENCE
- BOUNDARY OF STRUCTURAL BACKFILL IN 1999

GRAPHIC SCALE

0 40 80 160

(IN FEET)

TOPOGRAPHIC REFERENCE:

AERIAL TOPO BY CALVADA SURVEYING INC.
108 BUSINESS CENTER DRIVE, CORONA CA 92880-1782
PHONE: (909) 280-9960
BASED ON U.S.G.S. MONUMENT F 131, ELEC = 28.82 (NAVD 88)
AERIAL SURVEY DATE: MARCH 9 2000

IT CORPORATION

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 3-6
FINAL SITE GRADE AS-BUILT CONDITIONS
IR SITE 1E
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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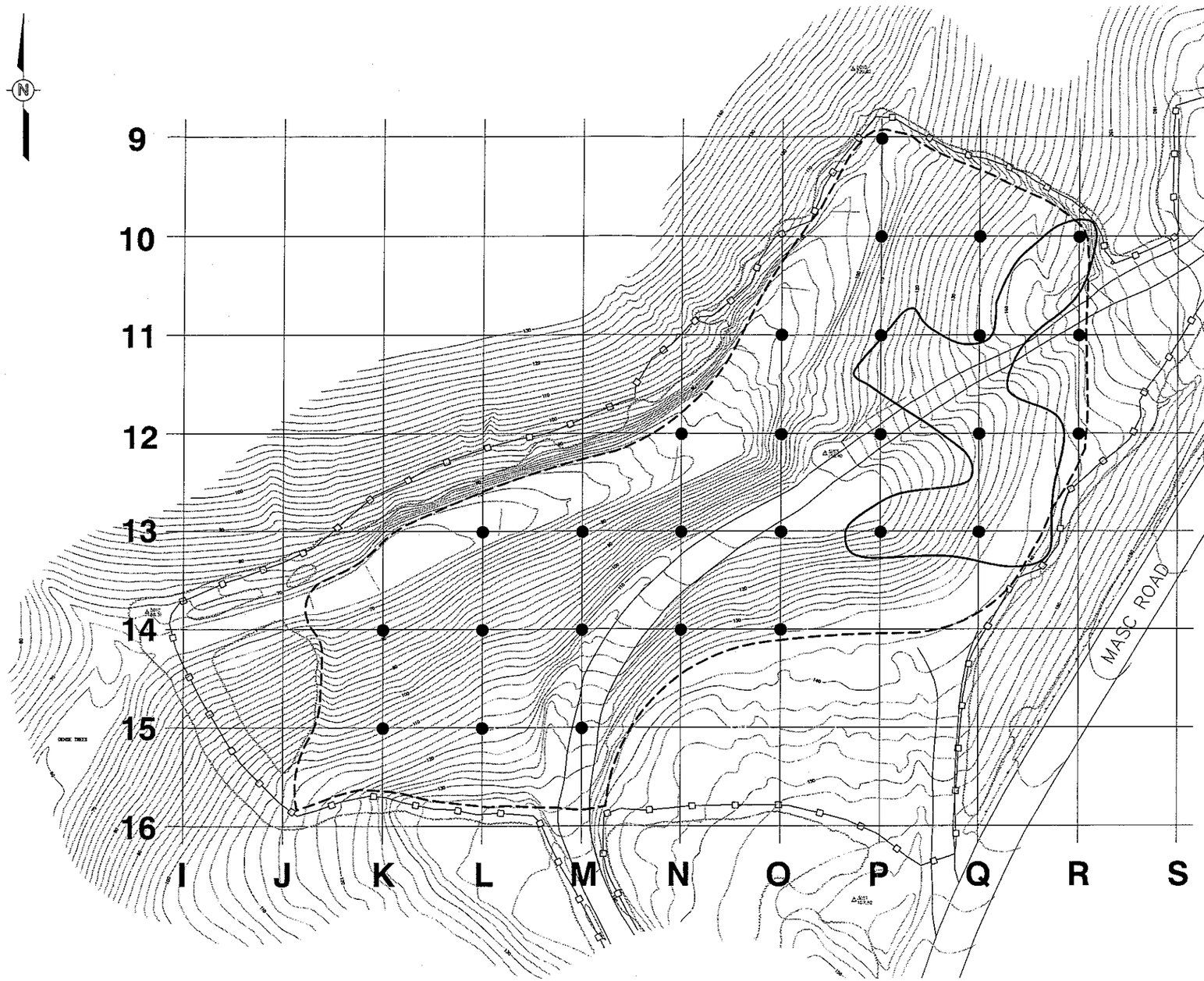

LEGEND:

- SILT/TOAD FENCE
- LIMITS OF OVER-EXCAVATION
- FLOOR CONFIRMATION SAMPLING LOCATION
- 300 CONTOUR AT COMPLETION OF OVER-EXCAVATION
- PLANNED EXCAVATION BOUNDARY

GRAPHIC SCALE

80 0 40 80

(IN FEET)

TOPOGRAPHIC REFERENCE:

AERIAL TOPO BY CALVADA SURVEYING INC
108 BUSINESS CENTER DRIVE CORONA, CA 92880-1782
PHONE: (909) 280-9960
BASED ON U.S.G.S. MONUMENT F 131, ELEC. = 28.82 (NAVD 88)
AERIAL SURVEY DATE: MARCH 9, 2000

IT CORPORATION

EFA WEST
CAMP PENDLETON, CALIFORNIA

FIGURE 4-1
POST-EXCAVATION AS-BUILT CONDITION IR SITE 1E
MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA

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TABLES

Table 2-1
Remediation Standards for Soil at IR Site 1E

COCs	Maximum Concentration in RI/FS[a] (mg/kg)	Remediation Standard, 0 to 5 Feet Below Ground Surface (mg/kg)	Basis[a,b]	Remediation Standard, 5 to 10 Feet Below Ground Surface (mg/kg)	Basis[a,c]
Aluminum	47,200	20.999	Background	--	--
Antimony	140	8.8	Background	31	PRG
Arsenic	11	4.3	Background	4.3	Background
Cadmium	9.3	9	PRG	9	PRG
Chromium	104	33	Background	33	Background
Cobalt	25	13	Background	--	--
Copper	1,660	26	Background	--	--
Iron	61,500	26,495	Background	--	--
Lead	1,610	29	Background	130	PRG
Zinc	5,930	960	PLE	--	--

[a]*Source: Marine Corps Base Camp Pendleton, California, Record of Decision, Operable Unit 3, Final (SWDIV, 1999a)*

[b]*Goal is noted as either PRG, PLE, or background, whichever is the basis for the goal for 0 to 5 feet below ground surface*

[c]*Goal is noted as either PRG, PLE, or background, whichever is the basis for the goal for 5 to 10 feet below ground surface*

-- Indicates that compound is not a remediation contaminant of concern at that depth interval

COCs – chemicals of concern
mg/kg – milligrams per kilogram
PLE – preliminary limit of exposure
PRG – preliminary remediation goal
RI/FS – remedial investigation/feasibility study
µg/kg – micrograms per kilogram

Table 3-1
Summary of Initial Perimeter (Wall) Confirmation Sampling Results

Cleanup Standard[a]			Analyte	Aluminum		Antimony		Arsenic		Cadmium		Chromium		Cobalt		Copper		Iron		Lead		Zinc	
			0 to 5 feet	20,999 (BG)		8.8 (BG)		4.3 (BG)		9 (PRG)		33 (BG)		13 (BG)		26 (BG)		26,495 (BG)		29 (BG)		960 (PLE)	
			5 to 10 feet	--		31 (PRG)		4.3 (BB)		9 (PRG)		33 (BG)		--		--		--		130 (PRG)		--	
			Unit	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Sample Identifier	Sample Location Number	Sample Depth	Date Collected																				
19739-071	Site 1E-1171	3.0'	12/9/1998	11,600		0.42	U	2.2	U	0.046	U	19.4		7.5		11.6		16,800		11.6		48.4	
19739-068	Site 1E-1173	3.0'	12/9/1998	18,200		0.44	U	3.1		0.048	U	25.8		14.1	X	13.7		24,400		8.9		60.4	
19739-067	Site 1E-1175	3.0'	12/9/1998	16,800		0.45	U	3.2		0.050	U	25.9		10.5		38.4	X	25,900		31.4	X	73	
19739-065	Site 1E-1177	3.0'	12/9/1998	18,000		0.47	U	1.6	U	0.051	U	32.8		9.1		19.2		21,700		5.8		64	
19739-066	Site 1E-1179	3.0'	12/9/1998	13,600		0.44	U	3.3		0.048	U	22.7		12		11		21,200		5.1		48.9	
19739-075	Site 1E-1181	3.0'	12/9/1998	11,000		0.42	U	1.9		0.046	U	14.2		4.3		3.8		11,100		5.5		15.4	
19739-072	Site 1E-1183	2.5'	12/9/1998	9,750		0.42	U	1.3	U	0.046	U	15.8		4.3		380	X	9,920		28.4		39.1	
19739-073	Site 1E-1185	3.0'	12/9/1998	26,300	X	23.9	JX	8.7	X	4.9		44	X	11.5		950	X	54,000	X	1,040	X	1,980	X
19739-069	Site 1E-1187	2.5'	12/9/1998	27,000	X	13	JX	8.2	X	3.7		77.3	X	11.8		387	X	66,700	X	670	X	2,790	X

Cleanup Standard[a]: Cleanup standards are based on background (BG), preliminary limit of exposure (PLE), or preliminary remediation goal (PRG).

B - analyte also found in the laboratory method blank
J - estimated value
mg/kg - milligrams per kilogram
U - not detected above or equal to the stated reporting limit
X - result exceeds the 0 to 5 foot cleanup standard

Table 3-2
Summary of Floor Confirmation Sampling Data at Planned Excavation Depth

Cleanup Standard[a]				Analyte	Aluminum		Antimony		Arsenic		Cadmium		Chromium		Cobalt		Copper		Iron		Lead		Zinc	
				0 to 5 feet	20,999 (B)		8.8 (B)		4.3 (B)		9 (PRG)		33 (B)		13 (B)		26 (B)		26,495 (B)		29 (B)		960 (PLE)	
				5 to 10 feet	--		31 (PRG)		4.3 (B)		9 (PRG)		33 (B)		--		--		--		130 (PRG)		--	
				Unit	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Sample Identifier	Grid Location	Sample Location Number	Sample Depth	Date Collected																				
	B8 *																							
19739-618	C3	1EC3-01	0.5	8/30/1999	17,100		6.50		3.6		1.10		28.2		11.6		1,070.0	X	31,400	X	149.0	X	563	
19739-620	C4	1EC4-01	0.5	8/30/1999	22,800	X	2.90		5	X	0.6		38.0	X	15.4	X	53	X	35,800	X	184	X	193	
19739-628	C7	1EC7-01	0.5	8/30/1999	24,100	X	68.40	X	12	X	9.10	X	71.9	X	15.9	X	2,310.0	X	80,000	X	1,440.0	X	4260	X
19739-629	C8	1EC8-01	0.5	8/30/1999	14,300		27.40	X	3		1.1		21		8.9		52	X	17,300		617	X	1580	X
19739-614	D4	1ED4-01	0.5	8/30/1999	20,400		2.00		4		0.4		32.0		12.1		49	X	33,900	X	56	X	188	
19739-616	D5	1ED5-01	0.5	8/30/1999	19,300		18.40	X	5	X	3.2		46.9	X	14.2	X	423	X	42,600	X	382.0	X	1300	X
19739-622	D7	1ED7-01	0.5	8/30/1999	18,600		59.10	X	12	X	6.5		64.1	X	17.6	X	989	X	81,000	X	932.0	X	3770	X
19739-624	D8	1ED8-01	0.5	8/30/1999	16,100		1.50		3		0.5		24.5		9.4		34	X	21,300		33	X	166	
19739-609	E4	1EE4-01	0.5	8/30/1999	28,000	X	0.31		7	X	0.1		46.4	X	15.0	X	26		48,300	X	8		128	
19739-611	E5	1EE5-01	0.5	8/30/1999	15,300		3.40		4		0.7		29.2		10.8		56	X	25,900		77	X	218	
19739-632	E6	1EE6-01	0.5	8/30/1999	18,700		101.00	X	14.3	X	13.9	X	109	X	19.7	X	6870	X	103,000	X	1570	X	4960	X
	E7 *																							
	E8 *																							
19739-605	F2	1EF2-01	0.5	8/30/1999	18,700		0.31		6.6	X	0.4		25.5		10.4		18.1		29,700	X	5.1		103	
19739-607	F3	1EF3-01	0.5	8/30/1999	20,800		0.30		5.8	X	0.90		34	X	11.5		17.5		38,500	X	5		93.2	
	F5 *																							
19739-597	F6	1EF6-01	0.5	8/25/1999	15,600		59.00	X	9.5	X	4.5		49.6	X	16.3	X	608.0	X	62,300	X	2,080.0	X	5110	X
19739-594	F7	1EF7-01	0.5	8/25/1999	8,470		3.10		2.5		0.7		17.4		6.4		54.0	X	19,000		92.5	X	232	
19739-591	F8	1EF8-01	0.5	8/25/1999	15,600		0.88		3.8		0.5		28.7		8.3		14.1		24,800		5.0		55.2	
19739-601	G1	1EG1-01	0.5	8/30/1999	24,200	X	1.20		31.6	X	0.7		49.5	X	14.4	X	41.0	X	93,900	X	4.7		151	
19739-603	G2	1EG2-01	0.5	8/30/1999	22,900	X	0.33		3.3		0.1		32.2		14.8	X	15.3		29,800	X	7.5		70.3	

Cleanup standard [a] - Cleanup standards are based on background (B), preliminary limit of exposure, or preliminary remediation goal (PRG).

*(*) - Sampling was discontinued prior to obtaining samples from this location as a result of changing sampling grid to accommodate new excavation boundary.*

J - estimated value

mg/kg - milligrams per kilogram

X - result exceeds the 0 to 5 foot cleanup standard

Table 3-3
Summary of Floor Confirmation Sampling Data at Overexcavation Depth

Cleanup Standard[a]				Analyte	Aluminum		Antimony		Arsenic		Cadmium		Chromium		Cobalt		Copper		Iron		Lead		Zinc	
				0 to 5 feet	20,999 (B)		8.8 (B)		4.3 (B)		9 (PRG)		33 (B)		13 (B)		26 (B)		26,495 (B)		29 (B)		960 (PLE)	
				5 to 10 feet	--		31 (PRG)		4.3 (B)		9 (PRG)		33 (B)		--		--		--		130 (PRG)		--	
				Unit	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Sample Identifier	Grid Location	Sample Location Number	Sample Depth	Date Collected																				
19739-927	K14	1EK14-01	0.5	11/11/1999	11,900		< 0.63		2.5		0.80	J	23.1		10.7		11.1		20,000		1.3	J	54.6	
19739-920	K15	1EK15-01	0.5	11/11/1999	18,900		< 0.64		2.0		< 0.91		30.6		11.5		13.8		27,900	X	2.1		84.6	
19739-962	L13	1EL13-01	0.5	12/3/1999	10,400		< 0.11		2.8		0.71		19.7		6.9		10.7		15,100		2.5		40.9	
19739-925	L14	1EL14-01	0.5	11/11/1999	20,400		< 0.70		3.7		1.10		32.9		9.2		20.4		30,900	X	4.7		88.7	
19739-917	L15	1EL15-01	0.5	11/11/1999	18,900		< 0.68		3.3		2.50		34.7	X	16.2	X	18.3		30,100	X	4.3		85.8	
19739-958	M13	1EM13-01	0.5	12/3/1999	18,100		< 0.12		3.9		0.77		29.9		11.2		17.0		27,500	X	3.9		77.0	
19739-923	M14	1EM14-01	0.5	11/11/1999	19,400		< 0.69		12.0	X	0.35	J	40.5	X	8.7		24.4		39,300	X	7.1		74.2	
19739-969	M15	1EM15-01	0.5	12/3/1999	18,200		< 0.12		4.5	X	0.20	J	35.9	X	19.3	X	18.9		35,800	X	4.1		91.6	
19739-953	N12	1EN12-01	0.5	12/3/1999	10,700		< 0.12		3.3		0.36		20.6		7.9		10.3		16,700		2.8		51.3	
19739-960	N13	1EN13-01	0.5	12/3/1999	14,100		< 0.12		3.8		0.37		27.1		10.5		13.6		23,900		3.3		69.6	
19739-933	N14	1EN14-01	0.5	11/11/1999	23,900	X	< 0.69		3.8		< 0.99		48.4	X	11.8		29.3	X	47,400	X	4.1		113.0	
19739-850	O11	1EO11-01	0.5	10/21/1999	20,100		< 0.66		1.1		< 0.94		33.1	X	9.9		17.1		26,100		7.6		84.4	
19739-955	O12	1EO12-01	0.5	12/3/1999	16,600		< 0.11		3.0		1.10		30.5		10.5		187.0	X	30,100	X	60.8	X	214.0	
19739-931	O13	1EO13-01	0.5	11/11/1999	15,200		< 0.60		4.6	X	0.17	J	26.8		9.2		14.7		24,800		6.5		63.7	
19739-929	O14	1EO14-01	0.5	11/11/1999	21,200	X	< 0.62		0.5	J	< 0.88		37.3	X	12.5		18.7		30,300	X	6.8		97.4	
19739-844	P9	1EP9-01	0.5	10/21/1999	15,300		< 0.59		1.7		0.14		24.5		9.0		25.3		19,000		6.5		58.8	
19739-842	P10	1EP10-01	0.5	10/21/1999	6,440		< 0.58		1.1		0.09		17.3		8.8		5.3		9,170		2.9		48.8	
19739-848	P11	1EP11-01	0.5	10/21/1999	17,600		< 0.68		1.7		0.05		31.4		9.1		17.4		27,600	X	4.9		79.7	
19739-966	P12	1EP12-01	0.5	12/3/1999	15,300		< 0.11		2.0		0.02	J	27.5		8.0		14.9		26,800	X	5.2		65.1	
19739-864	P13	1EP13-01	0.5	10/27/1999	9,020		< 0.29		5.7	X	0.94		21.1		6.8		10.1		20,400		2.5		46.9	
19739-838	Q10	1EQ10-01	0.5	10/21/1999	22,400	X	< 0.75		3.8		< 1.10		29		6.9		17.0		25,400		12.0		73.5	
19739-840	Q11	1EQ11-01	0.5	10/21/1999	18,100		< 0.65		5.2	X	6.20		38.7	X	9.1		22.6		37,200	X	5.0		473.0	
19739-861	Q12	1EQ12-01	0.5	10/27/1999	18,800		< 0.31		18.0	X	0.42	J	47.7	X	18.1	X	22.8		44,000	X	2.6		122.0	
19739-854	Q13	1EQ13-01	0.5	10/21/1999	9,630		< 0.62		2.0		0.17		18.6		4.3		8.5		15,800		2.6		36.5	
19739-856	R10	1ER10-01	0.5	10/27/1999	21,700	X	0.71		10.2	X	< 0.97		39.1	X	54.6	X	25.8		47,400	X	12.1		101.0	
19739-858	R11	1ER11-01	0.5	10/27/1999	16,900		< 0.29		1.1	J	< 0.88		29.9		10.9		17.9		24,000		3.0		73.6	
19739-852	R12	1ER12-01	0.5	10/21/1999	24,800	X	< 0.77		5.8	X	19.50	X	42.6	X	77.9	X	29.6	X	38,500	X	8.2		378.0	

Cleanup Standard [a] - Cleanup standards are based on background (B), preliminary limit of exposure (PLE), or preliminary remediation goals (PRG).

J - estimated value
mg/kg - milligrams per kilogram
X - result exceeds the 0 to 5 foot cleanup standard

Table 3-4
Summary of Waste Transportation Production

Date	Number of Trucks	Number of Daily Loads	Daily Volume Hauled (yd^3)	Accumulative Total Hauled (yd^3)	Comments
8/24/1999	1	2	26	26	One truck to test haul road
8/26/1999	7	61	793	819	
8/27/1999	10	96	1248	2067	6 hours of hauling
9/14/1999	0	0	0	0	Started overexcavation
9/20/1999	9	22	286	2353	Half day of hauling
9/21/1999	9	98	1274	3627	Trucks stopped at 2:00 pm
9/22/1999	9	125	1625	5252	
9/23/1999	9	134	1742	6994	
9/24/1999	9	103	1339	8333	
9/27/1999	9	134	1742	10075	
9/28/1999	9	134	1742	11817	
9/29/1999	9	129	1677	13494	
9/30/1999	9	127	1651	15145	
10/1/1999	11	164	2132	17277	
10/4/1999	9	117	1521	18798	
10/5/1999	5	72	936	19734	
10/11/1999	5	72	936	20670	
10/12/1999	6	88	1144	21814	
10/13/1999	6	81	1053	22867	
10/14/1999	12	200	2600	25467	
10/15/1999	20	170	2210	27677	
10/18/1999	6	87	1131	28808	
10/19/1999	7	103	1339	30147	
10/20/1999	8	114	1482	31629	
10/21/1999	7	103	1339	32968	
10/22/1999	9	113	1469	34437	
10/25/1999	8	122	1586	36023	
10/26/1999	8	125	1625	37648	
10/27/1999	8	110	1430	39078	
10/28/1999	8	55	715	39793	
11/3/1999	2	2	26	39819	Tested new haul road and loading area
11/4/1999	6	92	1196	41015	
11/5/1999	12	178	2314	43329	
11/8/1999	7	42	546	43875	
11/9/1999	12	141	1833	45708	
11/10/1999	11	165	2145	47853	
11/11/1999	12	102	1326	49179	
11/12/1999	12	119	1547	50726	
11/15/1999	12	166	2158	52884	
11/16/1999	12	165	2145	55029	
11/17/1999	12	154	2002	57031	
11/18/1999	12	132	1716	58747	
11/19/1999	10	26	338	59085	Half day of hauling; End of fieldwork

Estimated Total Volume per Work Plan: *2 078 yd^3*

Estimated Total Overexcavation Volume: *57 007 yd^3*

Actual Number of Loads: *4 545 loads*

Estimated Number of Loads: *160 loads*

(assume 13 in-place cubic yards per load using expansion of 1 2)

yd^3 - cubic yard

Table 3-5
Summary of Additional Perimeter (Wall) Confirmation Sampling Results

Cleanup Standard[a]			Analyte	Aluminum		Antimony		Arsenic		Cadmium		Chromium		Cobalt		Copper		Iron		Lead		Zinc	
			0 to 5 feet	20,999 (B)		8.8 (B)		4.3 (B)		9 (PRG)		33 (B)		13 (B)		26 (B)		26,495 (B)		29 (B)		960 (PLE)	
			5 to 10 feet	--		31 (PRG)		4.3 (B)		9 (PRG)		33 (B)		--		--		--		130 (PRG)		--	
			Unit	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Sample Identifier	Sample Location Number	Sample Depth	Date Collected																				
19739-974	1E-PS01-01	0.5	2/29/2000	13,400		< 0.49		6.2	X	< 0.85		24.2		9.6		10.7		20,600		6.7		43.1	
19739-976	1E-PS02-01	0.5	2/29/2000	18,200		< 0.52		5.1	X	0.05	J	28.6		10.9		16.8		28,000	X	29.3	X	70.2	
19739-978	1E-PS03-01	0.5	2/29/2000	17,100		< 0.55		5.6	X	1.30		33.2	X	14.0	X	21.4		31,400	X	5.7		77.9	
19739-980	1E-PS04-01	0.5	2/29/2000	8,500		< 0.52		4.2		0.31	J	17.6		9.3		9.1		15,000		2.8		47.2	
19739-981	1E-PS04-01D	0.5	2/29/2000	8,220		< 0.13		3.5		0.31		16.8		6.4		8.7		13,200		2.4		42.7	
19739-983	1E-PS05-01	0.5	2/29/2000	15,400		< 0.58		5.0	X	0.40	J	27.3		8.6		18.9		27,200	X	6.0		76.1	
19739-985	1E-PS06-01	0.5	2/29/2000	15,000		< 0.54		4.4	X	0.14	J	24.3		10.5		13.7		25,800		4.4		58.8	
19739-986	1E-PS07-01	0.5	2/29/2000	19,600		< 0.55		3.5		< 0.96		25.0		10.6		11.0		25,000		5.4		54.7	
19739-987	1E-PS08-01	0.5	2/29/2000	6,430		< 0.13		1.1		0.04	J	8.5		5.7		4.4		9,870		2.6		26.3	
19739-964	1EK13-01	0.5	12/3/1999	21,500	X	< 0.13		4.7	X	0.35		35.8	X	15.7	X	22.7		34,100	X	5.4		94.4	

Cleanup Standard[a] - Cleanup standards are based on background (B), preliminary limit of exposure (PLE), or preliminary remediation goals (PRG).

J - estimated value
mg/kg - milligrams per kilogram
X - result exceeds the 0 to 5 foot cleanup standard

Table 3-6
Summary of Hot Spot Sampling Results

Analyte				Aluminum		Antimony		Arsenic	Barium	Cadmium		Chromium		Cobalt	Copper		Iron		Lead		Mercury	Selenium	Silver	Zinc
Cleanup Standard * (mg/kg)			0 to 5 feet	20999(B)		8.8(B)		4.3 (B)	--	9 (PRG)		33 (B)		13 (B)	26 (B)		26495 (B)		29 (B)		--	--	--	960 (PLE)
			5 to 10 feet	--		31 (PRG)		4.3 (B)	--	9 (PRG)		33 (B)		--	--		--		130 (PRG)		--	--	--	--
			Unit	mg/kg		mg/kg		mg/kg	mg/kg	mg/kg		mg/kg		mg/kg	mg/kg		mg/kg		mg/kg		mg/kg	mg/kg	mg/kg	mg/kg
Sample Identifier	Sample Location Number	Sample Depth Below PED (ft)	Date Collect																					
19739-955	**1E-O12-01**	**0.5**	**12/3/1999**	**16600**	J	**0.11**	U	3	**N/A**	1.1		**30.5**		**10.5**	**187**	X	**30100**	X	**60.8**	X	**N/A**			214
19739-1019	1E-O12-A1	2.0	7/13/2000	10,800		4.8		3.8	N/A	1.0		15.9		11	42.3	X	31,000		28.2		N/A	N/A	N/A	277
19739-1020	1E-O12-A1D	2.0	7/13/2000	11,300		0.98		3.1	N/A	0.39		19.6		11.3	46.8	X	23,200		35.3	X	N/A	N/A	N/A	191
19739-1022	1E-O12-B1	2.0	7/13/2000	13,900		0.076	U	7.3	N/A	1.3		34.6		10.9	27.6		23,900		4.8		N/A	N/A	N/A	96.3
19739-1025	1E-O12-C1	2.0	7/13/2000	11,500		0.082	U	2.6	N/A	<0.94		21.6		6.8	11.2		14,900		3.2		N/A	N/A	N/A	55
19739-1027	1E-O12-D1	2.0	7/13/2000	11,600		0.31		3.9	N/A	0.19	J	21.6		7.2	12.9		23,700		5.4		N/A	N/A	N/A	70.8
19739-1134	1E-012-CS1*	0.5	9/29/2000	N/A		0.17	J	2.7	135	0.51		28.4		11.5	25.6		NA		29.5	X	N/A	N/A	N/A	124
19739-1135	1E-012-CS2*	0.5	9/29/2000	N/A		0.17	J	2.7	140	0.49		28.8		10.7	21.5		NA		20		N/A	N/A	N/A	139
19739-1137	1E-012-R1	0.5	12/4/2000	14,800		0.48	U	3.9	N/A	0.6J		27.5		10.5	37.5	X	24,900		53.5	X	N/A	N/A	N/A	166
19739-1138	1E-012-R1D	0.5	12/4/2000	15,800		0.52	U	3.9	N/A	0.85		28.5		11.4	40.6	X	24,000		64.9	X	N/A	N/A	N/A	182
19739-1139	1E-012-R2	2.0	12/4/2000	12,500		0.33	U	2.2	N/A	0.22J		23.2		7.5	11.1		19,900		2.5		N/A	N/A	N/A	60.3
		TCLP Limits (µg/L)						**5000**	**100000**	**1000**		**5000**							**5000**		**200**	**1000**	**5000**	
TCLP	1E-012-CS1*	0.5	9/29/2000	N/A		N/A		7.1J	8.0J	0.98	U	1.5	J	N/A	N/A		N/A		1.8	U	0.22	J 4.6	J 1.2	U N/A
TCLP	1E-012-CS2*	0.5	9/29/2000	N/A		N/A		6.7J	6.9J	0.98	U	1.5	J	N/A	N/A		N/A		1.8	U	0.23	J 4.2	U 1.2	U N/A

Cleanup Standards[a] - Standards are based on background (B), preliminary limit of exposure (PLE), and preliminary remedial goals (PRG).

CS - Composite sample made of four randomly collected individual samples within the sampling grid.*

ft - feet
J - Estimated value
mg/kg - milligrams per kilogram
N/A - not analyzed
TCLP - toxic characteristic leaching procedure
X - results exceeded the 0-5 feet cleanup standards.
µg/L - micrograms per liter

Table 4-1
Summary of Excavation Depth

Sample Identifier	Grid Location	Sample Location Number	Planned Excavation Depth	Pre-excavation Elevation *	Post-excavation Elevation **	Excavation Depth (feet)	Date Collected
19739-927	K14	1EK14-01	N/A	87.5	77.1	10.4	11/11/1999
19739-920	K15	1EK15-01	N/A	112.5	106.6	5.9	11/11/1999
19739-962	L13	1EL13-01	N/A	73.0	64.1	8.9	12/3/1999
19739-925	L14	1EL14-01	N/A	99.0	95.1	3.9	11/11/1999
19739-917	L15	1EL15-01	N/A	132.5	117.4	15.1	11/11/1999
19739-958	M13	1EM13-01	N/A	82.0	78.5	3.5	12/3/1999
19739-923	M14	1EM14-01	N/A	125.0	110.2	14.8	11/11/1999
19739-969	M15	1EM15-01	N/A	137.0	126.1	10.9	12/3/1999
19739-953	N12	1EN12-01	N/A	87.5	78.5	9.0	12/3/1999
19739-960	N13	1EN13-01	N/A	105.0	101.7	3.3	12/3/1999
19739-933	N14	1EN14-01	N/A	135.0	124.1	10.9	11/11/1999
19739-840	O11	1EO11-01	N/A	95.0	88.7	6.3	10/21/1999
19739-955	O12	1EO12-01	N/A	105.0	***94.0***	11.0	12/3/1999
19739-931	O13	1EO13-01	N/A	127.5	106.6	20.9	11/11/1999
19739-929	O14	1EO14-01	N/A	137.0	135.6	1.4	11/11/1999
19739-844	P9	1EP9-01	N/A	101.0	100.8	0.2	10/21/1999
19739-842	P10	1EP10-01	N/A	111.0	105.5	5.5	10/21/1999
19739-848	P11	1EP11-01	N/A	125.0	111.7	13.3	10/21/1999
19739-966	P12	1EP12-01	N/A	132.0	***115.0***	17.0	12/3/1999
19739-864	P13	1EP13-01	3	133.0	***130.0***	3.0	10/27/1999
19739-838	Q10	1EQ10-01	N/A	132.5	129.8	2.7	10/21/1999
19739-850	Q11	1EQ11-01	N/A	142.0	135.7	6.3	10/21/1999
19739-935	Q12	1EQ12-03	3	136.0	125.9	10.1	11/12/1999
19739-854	Q13	1EQ13-01	3	137.0	***133.0***	4.0	10/21/1999
19739-938	R10	1ER10-03	3	152.0	145.1	6.9	11/12/1999
19739-858	R11	1ER11-01	N/A	150.0	147.2	2.8	10/27/1999
19739-853	R12	1ER12-02	N/A	142.0	131.7	10.3	10/21/1999
					Average Excavation Depth (feet)	***8 1***	

*Pre-excavation Elevation * - Based on 1987 topograph at the site and some field verification*
*Post-excavation Elevation ** - Based on actual land survey with the exception of bold numbers, which were estimated from postexcavation topograph map (Figure 3-5)*

N/A - These are areas of over-excavation with no planned excavation depth

Table 4-2
Summary of Perimeter (Wall) Confirmation Sampling Results

Cleanup Standard[a]			Analyte	Aluminum		Antimony		Arsenic		Cadmium		Chromium		Cobalt		Copper		Iron		Lead		Zinc	
			0 to 5 feet	20,999 (B)		8.8 (B)		4.3 (B)		9 (PRG)		33 (B)		13 (B)		26 (B)		26,495 (B)		29 (B)		960 (PLE)	
			5 to 10 feet	--		31 (PRG)		4.3 (B)		9 (PRG)		33 (B)		--		--		--		130 (PRG)		--	
			Unit	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Sample Identifier	Sample Location Number	Sample Depth	Date Collected																				
19739-974	1E-PS01-01	0.5	2/29/2000	13,400		0.13	U	6.2	X	0.01	U	24.2		9.6		10.7		20,600	J	6.7		43.1	J
19739-976	1E-PS02-01	0.5	2/29/2000	18,200		0.14	U	5.1	X	0.05	J	28.6		10.9		16.8		28,000	JX	29.3	X	70.2	J
19739-978	1E-PS03-01	0.5	2/29/2000	17,100		0.14	U	5.6	X	1.30		33.2	X	14.0	X	21.4		31,400	JX	5.7		77.9	J
19739-980	1E-PS04-01	0.5	2/29/2000	8,500		0.14	U	4.2		0.31		17.6		9.3		9.1		15,000	J	2.8		47.2	J
19739-983	1E-PS05-01	0.5	2/29/2000	15,400		0.15	U	5.0	X	0.40		27.3		8.6		18.9		27,200	JX	6.0		76.1	J
19739-985	1E-PS06-01	0.5	2/29/2000	15,000		0.14	U	4.4	X	0.14	J	24.3		10.5		13.7		25,800	J	4.4		58.8	J
19739-986	1E-PS07-01	0.5	2/29/2000	19,600		0.14	U	3.5		0.02	J	25.0		10.6		11.0		25,000	J	5.4		54.7	J
19739-987	1E-PS08-01	0.5	2/29/2000	6,430		0.14	U	1.1		0.04	J	8.5		5.7		4.4		9,870	J	2.6		26.3	J
19739-964	1EK13-01	0.5	12/3/1999	21,500	X	0.13	U	4.7	X	0.35		35.8	X	15.7	X	22.7		34,100	X	5.4		94.4	
19739-938	1ER10-03	0.5	11/12/1999	22,700	X	0.70	U	1.1	J	3.10		31.6		29.0	X	18.6		23,800		7.2		95.5	
19739-858	1ER11-01	0.5	10/27/1999	16,900		0.29	U	1.1	J	0.02	J	29.9		10.9		17.9		24,000		3.0		73.6	
19739-853	1ER12-02	2.0	10/21/1999	18,700		0.65	U	1.5		0.42	J	32.0		9.7		14.8		25,800		4.5		71.4	
19739-075	1E-1181	3.0	12/9/1998	11,000		0.42	U	1.9		0.046	U	14.2		4.3		3.8		11,100		5.5		15.4	
			Average	15725.38		0.25		3.49		0.48		25.55		11.45		14.14		23205.38		6.81		61.89	
			Standard Deviation	4849.61		0.20		1.89		0.86		7.96		6.04		6.05		7308.38		6.91		24.15	
			Sample Number	13		13		13		13		13		13		13		13		13		13	
			Student's t-Distribution Value	1.771		1.771		1.771		1.771		1.771		1.771		1.771		1.771		1.771		1.771	
			$UCL_{95\%}$	**18,107**		**0.4**		**4**		**1**		**29**		**13**		**17**		**26,795**	**X**	**10**		**74**	

Cleanup Standard [a] - Cleanup standards are based on background (B), preliminary limit of exposure (PLE), or preliminary remediation goals (PRG).

B - analytes also found in the laboratory method blank

J - estimated value

mg/kg - milligrams per kilogram

U - not detected above or equal to the stated reporting limit

UCL_{95} - 95-percent upper confidence limit

X - result exceeds the 0 to 5 foot cleanup standard

Table 4-3
Summary of Floor Confirmation Sampling Results

Cleanup Standard[a]				Analyte	Aluminum		Antimony		Arsenic		Cadmium		Chromium		Cobalt		Copper		Iron		Lead		Zinc	
				0 to 5 feet	20,999 (B)		8.8 (B)		4.3 (B)		9 (PRG)		33 (B)		13 (B)		26 (B)		26,495 (B)		29 (B)		960 (PLE)	
				5 to 10 feet	--		31 (PRG)		4.3 (B)		9 (PRG)		33 (B)		--		--		--		130 (PRG)		--	
				Unit	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Sample Identifier	Grid Location	Sample Location Number	Sample Depth	Date Collected																				
19739-927	K14	1EK14-01	0.5	11/11/1999	11,900		0.63	U	2.5	J	0.80	J	23.1		10.7		11.1		20,000		1.3	J	54.6	
19739-920	K15	1EK15-01	0.5	11/11/1999	18,900		0.64	U	2.0	J	0.04	U	30.6		11.5		13.8		27,900	X	2.1		84.6	
19739-962	L13	1EL13-01	0.5	12/3/1999	10,400	J	0.11	U	2.8		0.71		19.7		6.9		10.7		15,100		2.5		40.9	
19739-925	L14	1EL14-01	0.5	11/11/1999	20,400		0.70	U	3.7	J	1.10		32.9		9.2		20.4		30,900	X	4.7		88.7	
19739-917	L15	1EL15-01	0.5	11/11/1999	18,900		0.68	U	3.3	J	2.50		34.7	X	16.2	X	18.3		30,100	X	4.3		85.8	
19739-958	M13	1EM13-01	0.5	12/3/1999	18,100	J	0.12	U	3.9		0.77		29.9		11.2		17.0		27,500	X	3.9		77.0	
19739-923	M14	1EM14-01	0.5	11/11/1999	19,400		0.69	U	12.0	JX	0.35	J	40.5	X	8.7		24.4		39,300	X	7.1		74.2	
19739-969	M15	1EM15-01	0.5	12/3/1999	18,200		0.12	U	4.5	X	0.20	U	35.9	X	19.3	X	18.9		35,800	X	4.1		91.6	
19739-953	N12	1EN12-01	0.5	12/3/1999	10,700	J	0.12	U	3.3		0.36		20.6		7.9		10.3		16,700		2.8		51.3	
19739-960	N13	1EN13-01	0.5	12/3/1999	14,100		0.12	U	3.8		0.37		27.1		10.5		13.6		23,900		3.3		69.6	
19739-933	N14	1EN14-01	0.5	11/11/1999	23,900	X	0.69	U	3.8	J	0.05	U	48.4	X	11.8		29.3	X	47,400	X	4.1		113.0	
19739-850	O11	1EO11-01	0.5	10/21/1999	20,100		0.66	U	1.1	J	0.94	U	33.1	X	9.9		17.1		26,100		7.6		84.4	
19739-1137	O12	1EO12-R1	0.5	12/4/2000	14,800		0.48	U	3.9		0.60	J	27.5		10.5		37.5	X	24,900	X	53.5	X	166.0	
19739-931	O13	1EO13-01	0.5	11/11/1999	15,200		0.60	U	4.6	JX	0.17	J	26.8		9.2		14.7		24,800		6.5		63.7	
19739-929	O14	1EO14-01	0.5	11/11/1999	21,200	X	0.62	U	0.5	J	0.04	U	37.3	X	12.5		18.7		30,300	X	6.8		97.4	
19739-844	P9	1EP9-01	0.5	10/21/1999	15,300	J	0.59	U	1.7		0.14	J	24.5		9.0		25.3		19,000		6.5		58.8	
19739-842	P10	1EP10-01	0.5	10/21/1999	6,440		0.58	U	1.1	J	0.09	U	17.3		8.8		5.3		9,170		2.9		48.8	
19739-848	P11	1EP11-01	0.5	10/21/1999	17,600		0.68	U	1.7		0.05	U	31.4		9.1		17.4		27,600	X	4.9		79.7	
19739-966	P12	1EP12-01	0.5	12/3/1999	15,300		0.11	U	2.0		0.02	U	27.5		8.0		14.9		26,800	X	5.2		65.1	
19739-864	P13	1EP13-01	0.5	10/27/1999	9,020		0.29	U	5.7	X	0.94		21.1		6.8		10.1		20,400		2.5		46.9	
19739-838	Q10	1EQ10-01	0.5	10/21/1999	22,400	X	0.75	U	3.8		1.10	U	29		6.9		17.0		25,400		12.0		73.5	
19739-840	Q11	1EQ11-01	0.5	10/21/1999	18,100		0.65	U	5.2	X	6.20		38.7	X	9.1		22.6		37,200	X	5.0		473.0	
19739-935	Q12	1EQ12-03	3.7	11/12/1999	18,800		0.67	U	5.0	JX	0.05	U	34.5	X	9.3		17.3	J	31,600	X	5.3		68.3	
19739-854	Q13	1EQ13-01	0.5	10/21/1999	9,630		0.62	U	2.0		0.17	J	18.6		4.3		8.5		15,800		2.6		36.5	
19739-938	R10	1ER10-03	3.7	11/12/1999	22,700	X	0.70	U	1.1	J	3.10		31.6		29.0	X	18.6	J	23,800		7.2	J	95.5	
19739-858	R11	1ER11-01	0.5	10/27/1999	16,900		0.29	U	1.1	J	0.02	U	29.9		10.9		17.9		24,000		3.0		73.6	
19739-853	R12	1ER12-02	2.0	10/21/1999	18,700		0.65	U	1.5		0.42	J	32.0		9.7		14.8	J	25,800		4.5		71.4	
				Average	16558.89		0.50		3.24		0.79		29.79		10.63		17.24		26195.19		6.53		90.14	
				Standard Deviation	4502.98		0.24		2.27		1.31		7.22		4.68		6.68		8039.06		9.65		80.70	
				Sample Number	27.00		27.00		27.00		27.00		27.00		27.00		27.00		27.00		27.00		27.00	
				Student's t-Distribution Value	1.703		1.703		1.703		1.703		1.703		1.703		1.703		1.703		1.703		1.703	
				$UCL_{95\%}$	**18,035**		**1**		**4**		**1**		**32**		**12**		**19**		**28,830**	**X**	**10**		**117**	

Cleanup Standard [a] - Cleanup standards are based on background (B), preliminary limit of exposure (PLE), or preliminary remediation goals (PRG).

B - analytes also found in the laboratory method blank

J - estimated value

mg/kg - milligrams per kilogram

U - not detected above or equal to the stated reporting limit

UCL_{95} - 95-percent upper confidence limit

X - result exceeds the 0 to 5 foot cleanup standard

APPENDIX A
CONSTRUCTION BIOLOGICAL SURVEY REPORT

MEC ANALYTICAL SYSTEMS, INC.

14 July 1999

Shane Austin
IT Corporation
3347 Michelson Drive, Suite 200
Irvine, California

Subject: Pre-construction site assessment of Sites 1D, 1E and 30 for IT Group, Camp Pendleton

MEC Analytical Systems (MEC) conducted pre-construction biological review of three Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) sites on Marine Corps Base Camp Pendleton on 13 July 1999. The survey was conducted by MEC's wildlife biologist (Trisha Smith) and a biologist from Varanus Biological Services, Inc. (Ingri Quon) who is qualified and permitted to survey California gnatcatcher, southwest willow flycatcher, least Bell's vireo, California least tern, and arroyo toad. At each site the soil material is contaminated with heavy metals and other man-made waste products. The project calls for vegetation to be cleared from each site, contaminated soil to be removed and the soil replaced with clean fill. The sites range in size from 0.52 acres (1E) to 5.40 acres (1D). On site vegetation is native and primarily of upland type with some wetland-associated species at the edge of the Santa Margarita River. The team was tasked with assessing the sites for any significant biological changes or new environmental concerns since the biological assessment was completed on 20 May 1999.

Site 1D

Site 1D (5.4 acres) is vegetated with disturbed coastal sage scrub with patches of open ground. Hottentot fig (*Carpobrotus* (= *Mesembryanthemum*) *edulis*) is common throughout the site. Several patches of willow scrub (*Salix* sp.) located just outside of but adjacent to the project area are currently occupied by federally listed endangered least Bell's vireos (*Vireo bellii pusillus*). A singing male vireo and at least one fledge occupy a patch of willow scrub immediately northeast of the excavation area (northeast of Stake 2004). We detected a second male vireo between the site and the Santa Margarita River near Stake 1056.

Two coastal California gnatcatcher (*Polioptila californica californica*) families used the site during the site visit. We detected one pair of gnatcatchers with at least one fledge (all birds unbanded) in the central and northeastern portions of the site. The second pair of gnatcatchers accompanied by three color-banded fledges was foraging in the southernmost area of the site near Stakes 1039 and 1038. The coastal California gnatcatcher is a federally listed threatened species.

The soil on site is suitable for overwintering arroyo toads (*Bufo californicus*) a a federally listed endangered species known to occur in the area. No reptiles or amphibians were detected during the assessment. The site vicinity is unlikely to support breeding southwestern willow flycatchers (*Empidonax traillii extimus*, a federally listed endangered species) due to the narrow breadth of the nearby riparian vegetation nearby and proximity of the site to heavily used roads.

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(760) 931-9225 FAX (760) 931-9251

98 Main St., Suite 428 Tiburon, CA 94920
(415) 435-1847 FAX (415) 435-0479

Site 1E

Site 1E (0.52 acres) is on a northwest-facing slope with patchy coastal sage scrub and baccharis scrub. During our survey on 13 July, we detected a pair of California gnatcatchers within 25 meters of the site on an adjacent slope. Although not detected on site, it is very likely the gnatcatchers utilize the on site baccharis and sage scrub vegetation. Arroyo toads are known from the area and, in addition to the Santa Margarita River, may breed in the perennial ponds southwest of the site – a distance of approximately 500 meters. The site does not provide suitable habitat for endangered southwestern willow flycatchers.

Site 30

Site 30 (1.84 acres) is vegetated scattered young willows, cattails, coastal sage scrub and broom baccharis (*Baccharis sarothroides*). The on-site and adjacent upland vegetation to the north and east is mature coastal sage scrub while to the west is a large freshwater marsh. The Santa Margarita River borders the site on the southern boundary where the river's edge is vegetated with young willows and cattails.

One pair of California gnatcatchers was detected foraging in coastal sage scrub in Areas 2 and 5 (the southern and eastern components of the site). A second gnatcatcher territory (evidenced by the presence of a singing adult male gnatcatcher) was detected west of the site on an east-facing slope overlooking the marsh.

The willow scrub adjacent to this site could provide a stopover area for migrant willow flycatchers (*E. t. brewsteri*, a state listed endangered species) but is unlikely to have breeding endangered southwestern willow flycatcher since potential breeding vegetation in the immediate vicinity is exposed and narrow.

Scheduled Work: Site 1A (visited by MEC/Varanus on 23 June 1999)

Work at Site 1A is scheduled to begin brush clearing the first week of August. A biologist knowledgeable of least Bell's vireo should monitor the brush clearing activity. Any work initiated in this area prior to 15 September may be considered "Take" of occupied vireo habitat and therefore a biologist should document least Bell's vireo in the area prior to commencement of work.

All sites were photodocumented for future reference. Please call me at (760) 931-8081 if you have any questions or concerns about the work areas.

Sincerely,

Karen Green
Project Manager and Biologist

MEC ANALYTICAL SYSTEMS, INC.

15 November 1999

Max Pan
IT Group
3347 Michelson Drive, Suite 200
Irvine, California

Subject: Construction Site Update, CERCLA Site 1E for IT Group, Camp Pendleton, Oceanside, California

Dear Mr. Pan,

MEC Analytical Systems, Inc. (MEC) conducted pre-construction biological review of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Site 1E on Marine Corps Base Camp Pendleton on 13 July 1999. The survey was conducted by MEC's wildlife biologist (Trisha Smith) and a biologist from Varanus Biological Services, Inc. (Ingri Quon, Permit #PRT-812740). At this site the soil is contaminated with heavy metals and has been the depository for other man-made waste products. The IT Group remediation project calls for vegetation to be cleared from the site, contaminated soil removed, and the removed soil replaced with clean fill. At that time the site consisted of an area of approximately 0.52 acres. Our survey included the entire north-facing hillside in the vicinity of the site. This area correlated to the gnatcatcher habitat surrounding the proposed worksite (approximately 6.0 acres). Only California gnatcatcher had been observed in the area during the biological assessment and feasibility study. On site vegetation included sparse to dense Diegan coastal sage scrub, patches of disturbed coastal sage scrub, a mesic wash characterized by a dense population of coyote bush (*Baccharis pilularis*) and several small areas of bare soil including a formerly used roadbed. Our task was to assess the site for any significant biological changes or new environmental concerns since the biological assessment was completed on 20 May 1999.

California Gnatcatcher

Biological surveys for the Biological Assessment (20 May 1999) indicated the presence of coastal California gnatcatchers (*Polioptila californica californica*) at Site 1E. On 13 July, permitted biologist Ingri Quon detected a pair of California gnatcatchers within 25 meters of the proposed work site on an adjacent slope. At that time Ms Quon indicated that although not detected on site during her survey it was very likely that the gnatcatchers utilize the on site baccharis and sage scrub vegetation. On numerous subsequent dates, Senior biologist Bill Haas (Permit #PRT-779910) and/or biological monitors Tom Myers and Trisha Smith observed gnatcatchers within the delineated work site and/or foraging in portions of the site that were cleared on later dates.

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Arroyo Toads

Arroyo toads (*Bufo californicus*) are known from the area (Biological Assessment, 20 May 1999). As a mitigation measure for remediation activity, the IT Group erected arroyo toad exclusionary fencing around the 1E site. Biologists consulted with IT personnel and coordinated the construction of an encircling exclusionary fence at the remediation site and a protective fence between the employee parking area and upland habitat between the work site and the nearby Santa Margarita River. No arroyo toads were observed during pre-construction surveys, which were conducted during daylight hours (arroyo toads are nocturnal); however, weather conditions were not conducive to arroyo toad activity (no recent seasonal rains) and the habitat was extremely dry and hard-packed. No arroyo toads were observed during any portion of the clearing and grubbing or soil excavation activities.

Other Potentially Occurring Sensitive Species

The site does not provide suitable habitat for endangered southwestern willow flycatchers (*Empidonax traillii extimus*) and only extremely marginal habitat for least Bell's vireos (*Vireo bellii pusillus*). Negative results from trapping (Boggs 1997) for endangered pacific pocket mice (*Perognathus longimembris pacificus*, PPM) and an analysis of habitat characteristics led to a finding of "no effect" to this species at Site 1E (Biological Assessment, 20 May 1999). Our visual surveys of the site (that is, unaccompanied by small mammal trapping) substantiate these findings. Most of the area has a dense vegetative cover of coastal sage scrub species (especially coastal sagebrush, *Artemisia californica*) along moderate to steep slopes. The soil at Site 1E is mostly inappropriate burrowing habitat for this small rodent with much of the upper layers of soil containing a noticeable clay component. One relatively small area in the southwest corner of the site (a small, sparsely vegetated mound) has some characteristics that might be suitable for PPM use. This portion of Site 1E (along with additional trap lines set within other portions of the site) was trapped as part of the Remedial Investigation and Feasibility Study (1998). No PPM were found at the site. Using these data, the Biological Assessment (1999) concluded, "there will be no effect to the Pacific pocket mouse as a result of remediation at (this) site". We found no evidence to contradict these findings. Based on a thorough search for burrows and fecal pellets, small mammal activity in this portion of the site appears to be extremely limited.

Expansion of Site 1E

Because of extensive contamination beyond what was found during initial phases of the site assessment, Site 1E was expanded in a northwest direction to include the baccharis drainage below the site and a small portion of the southeast-facing hillside along its northern border. Prior to clearing and grubbing of the area, biologists Tom Myers and Bill Haas investigated the site and subsequently Myers monitored clearing and grubbing

activity Preliminary surveys, including daily observations of bird activity by Myers, indicated that neither Bell's vireo nor willow flycatcher used the baccharis scrub on a transient or regular basis. No vireos or flycatchers were observed in or near any portion of the site during pre-construction surveys or during monitoring activity. No arroyo toads were observed during any phase of remediation activity. Additionally, this portion of the site is inhospitable for use by PPM except on a transient basis. A pair of gnatcatchers was often observed in the dense sage scrub in the westernmost portion of the site below the haul road and occasionally on the sparsely vegetated southeast-facing slope above the baccharis drainage. Although not banded or marked in any other way, because gnatcatchers generally maintain territories throughout the year, in all likelihood this was the same pair that was displaced by remediation activities. The remediation work site expanded from approximately 0.52 acres to 5.48 acres (acreages supplied by IT Group).

Results of Remediation Action

Remediation of Site 1E has resulted in the loss of approximately 4.1 acres of disturbed and high quality coastal sage scrub. A more accurate total will be calculated when all remediation activities at the site have been completed. The action has displaced one pair of California gnatcatchers, a federally threatened species. The gnatcatchers were not impacted during the breeding season. Because of documented use of the site on both an historic and recent basis, removal of the coastal sage habitat at 1E has resulted in the take of one pair of this threatened species. Because of the nature and purpose of the remediation actions, however, the take should be considered incidental in nature.

Vehicle Transit Relative to Site 1E

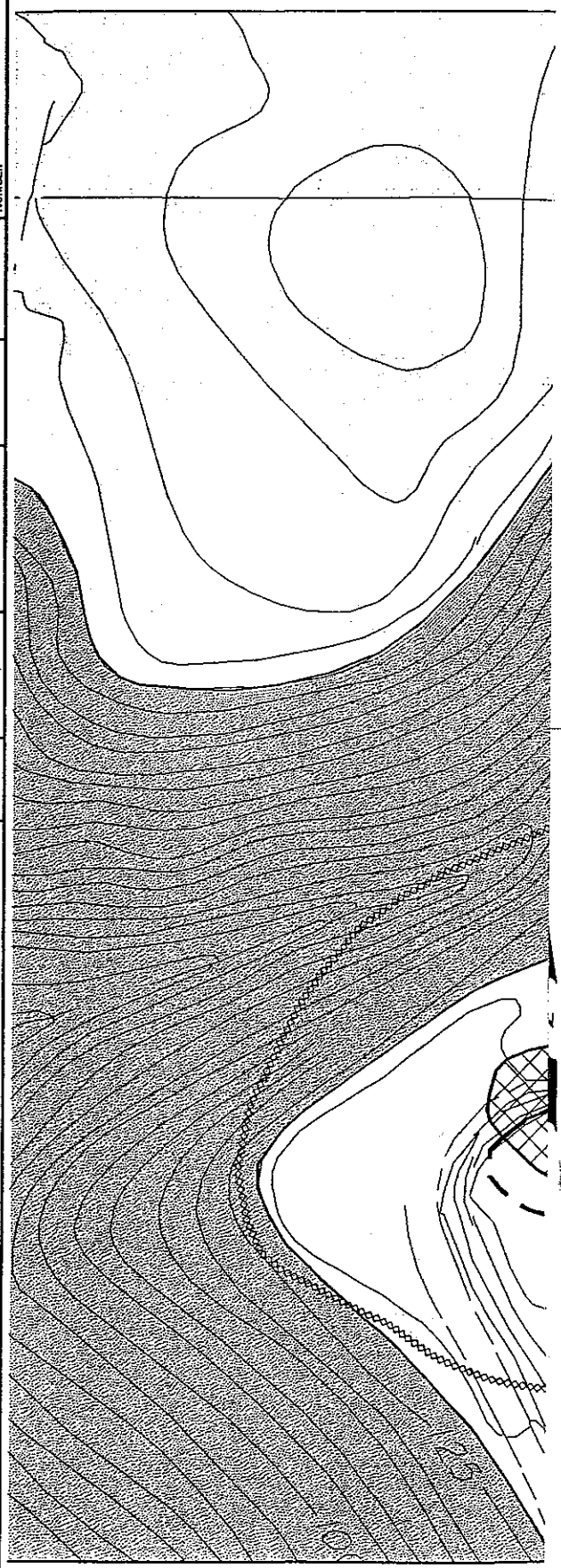
A dirt road located on a bluff area above Site 1E was accessed by IT personnel as a vantage point for surveying of the remediation site. The MEC team (including Varanus) learned of the use of this dirt road after the fact. This area is adjacent to a Pacific pocket mouse habitat study area and assessment of take is being made by the USFWS.

All sites were photodocumented for future reference. Please call us at (760) 931-8081 if you have any questions or concerns about the work areas.

Sincerely,

Karen Green
Senior Biologist

Att: Biological Assessment Figure 2-5
Remedial Investigation and Feasibility Study Figure 2-10



MCB Camp Pendleton Biological Assessment Group C/D Sites

- *CALIFORNIA SAGEBRUSH SERIES*
- *CALIFORNIA ANNUAL GRASSLAND SERIES*
- *OPEN/DISTURBED/DEVELOPED*
- *CALIFORNIA GNATCATCHER SIGHTING*
- *CALIFORNIA GNATCATCHER SURVEY ROUTE*
- *BOUNDARY CALIFORNIA GNATCATCHER SURVEY AREA*
- *APPROXIMATE SITE BOUNDARY INCLUDING STAGING AREAS*
- *TRUCK ROUTE*
- SURFACE-WATER FLOW DIRECTION (EPHEMERAL)

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 6C. DATE: DECEMBER 1987

SCALE 1 : 1200

0 100 200 FEET

FIGURE 2-5

SITE 1E - REFUSE BURNING GROUND IN 32 AREA

HABITATS AND OBSERVATIONS

MCB CAMP PENDLETON, CALIFORNIA

PREPARED FOR

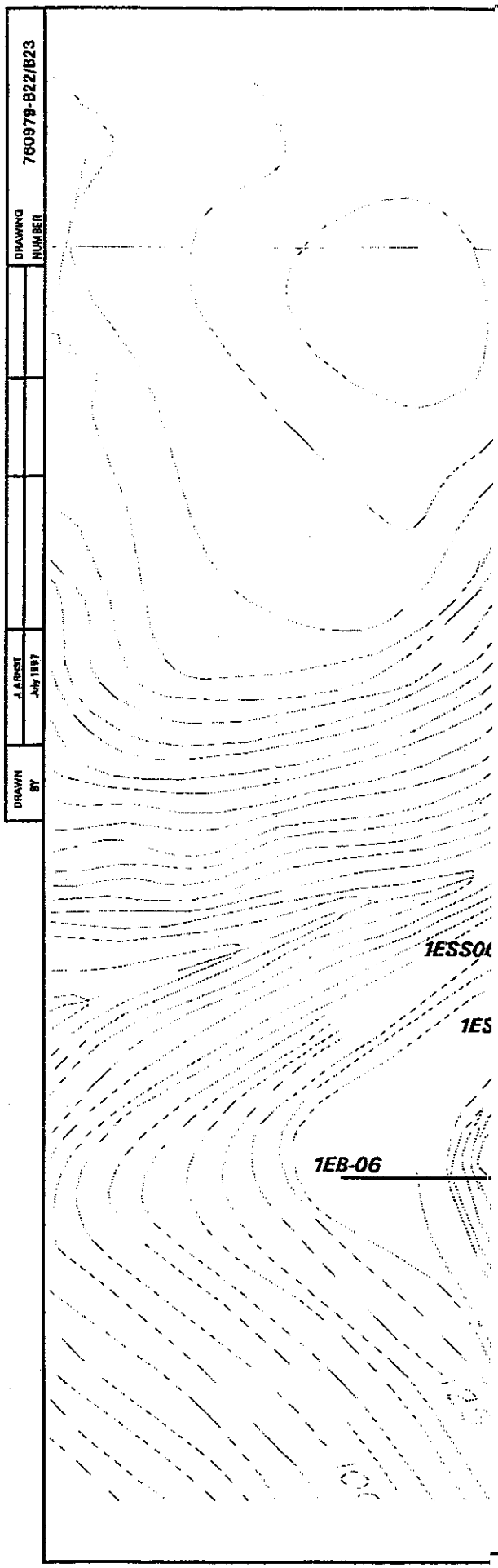
NAVAL FACILITIES ENGINEERING SERVICE CENTER

CONTRACT NO. N47408-92-D-3056

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NUMBER 760979-B22/B23

DRAWN BY J. ARNST July 1997



MCB Camp Pendleton Ecological Risk Assessment Group C/D Sites

1EB - 07 — BOREHOLE LOCATION

1ESS002 — SURFACE SOIL SAMPLE LOCATION

1EBG - 01 (BG) — 1EBG-01 BACKGROUND SOIL SAMPLE LOCATION

TRAP LINE WITH NUMBER OF TRAPS SET

SURFACE-WATER FLOW DIRECTION (EPHEMERAL)

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 6C. DATE: DECEMBER 1987

N

SCALE 1 : 1200

0 100 200 FEET

FIGURE 2-10

SITE 1E - REFUSE BURNING GROUND IN 32 AREA

TRAPPING LOCATIONS FOR THE PACIFIC POCKET MOUSE

MCB CAMP PENDLETON, CALIFORNIA

PREPARED FOR

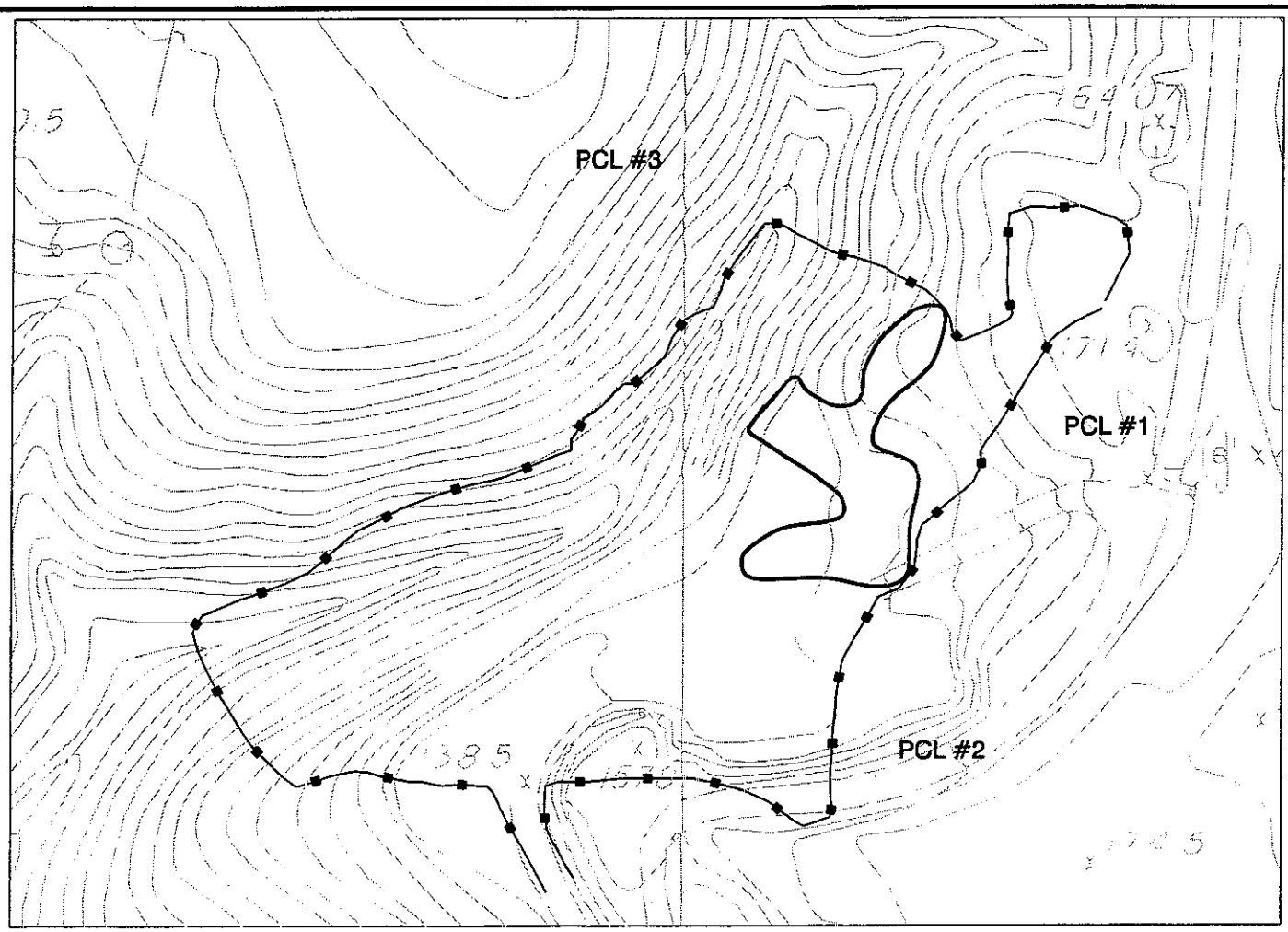
NAVAL FACILITIES ENGINEERING SERVICE CENTER

CONTRACT NO. N47408-92-D-3066

INTERNATIONAL TECHNOLOGY CORPORATION

APPENDIX B
PHOTOGRAPHS OF REMEDIAL CONSTRUCTION

BY	DATE	CHECKED BY	APPROVED BY	DRAWING NUMBER
JGC	6/30/00			



EXPLANATION:

- SILT FENCE
- PLANNED EXCAVATION BOUNDARY
- PHOTO CONTROL POINT (PCL)
- PRE EXCAVATION CONTOUR

NOTE:

SILT FENCE IDENTIFIES THE SITE BOUNDARY,
NOT THE EXCAVATION BOUNDARY

N

SCALE

0 150 300 FEET

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 24D
DATE: DECEMBER 1987

OHM Remediation Services Corp.
A Subsidiary of OHM Corporation
SAN DIEGO, CA

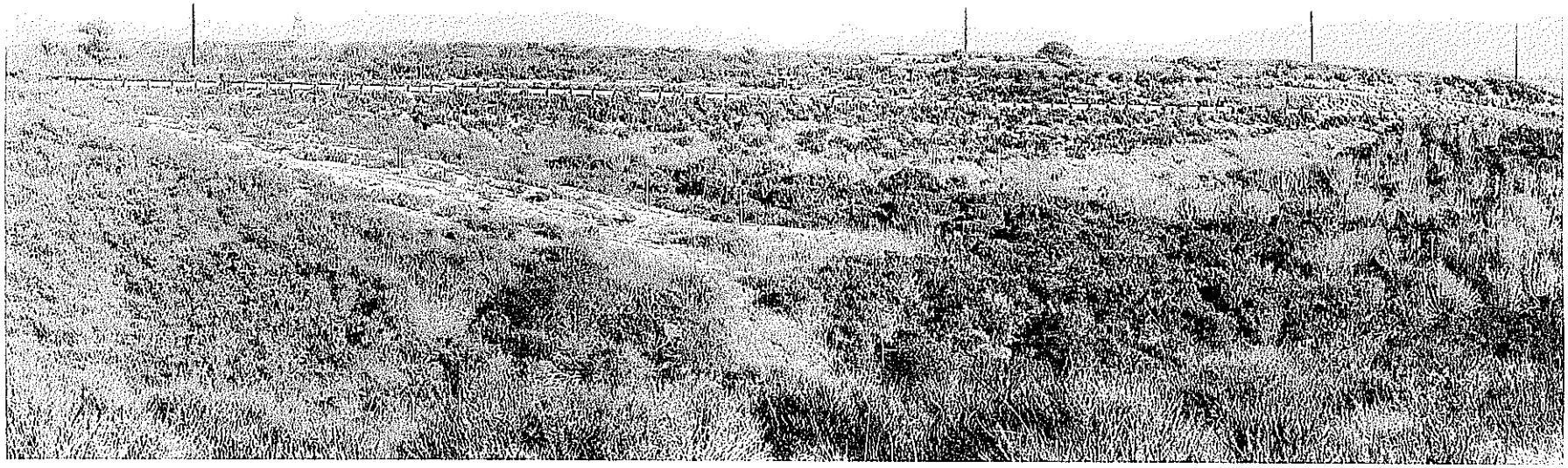
CONTRACT NAME: SWDIV

DRAWN BY	DATE
JGC	6/30/00
CHECKED BY	DATE
APPROVED BY	DATE
PROJECT MANAGER	DATE

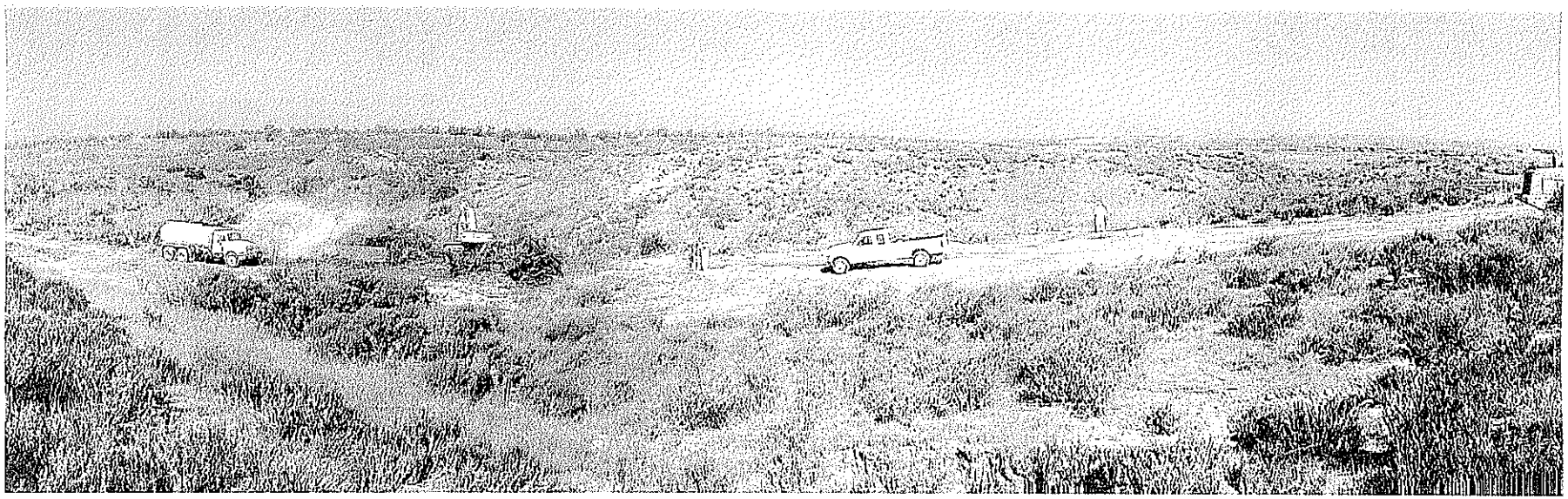
PHOTO CONTROL POINT LOCATIONS SITE 1E

MARINE CORPS BASESITE
CAMP PENDLETON, CALIFORNIA

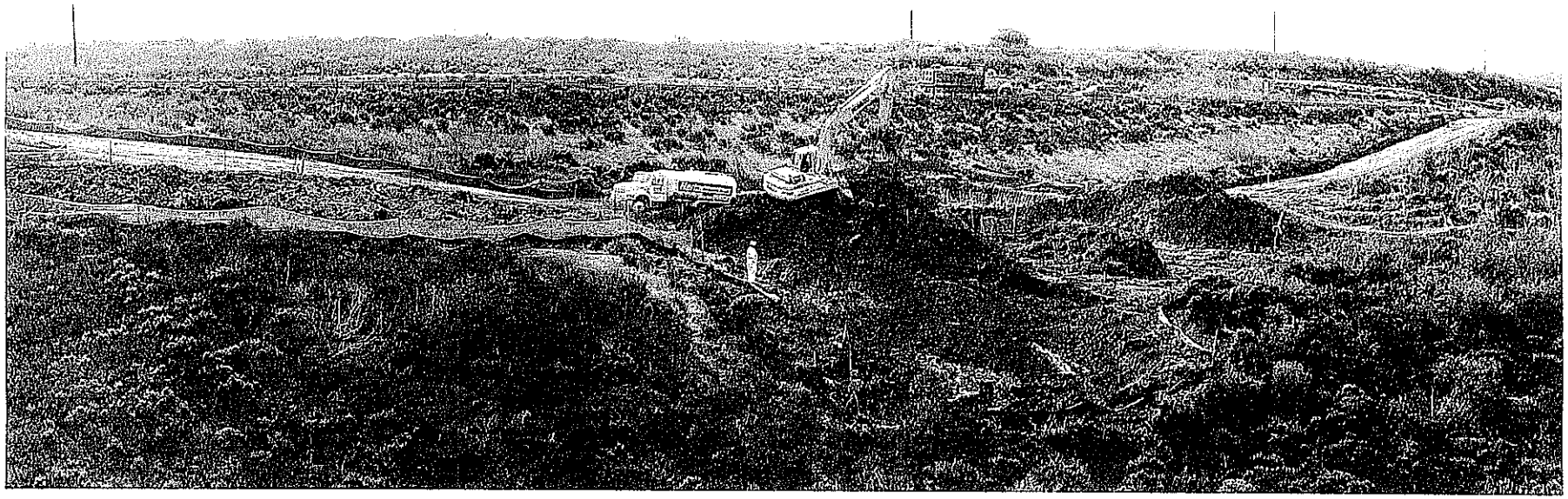
AUTOCAD FILE No.	PLOT SCALE	SHEET	OF	SCALE	DOCUMENT CONTROL No.	OHM PROJECT No.	FIGURE No.	REVISION
	1=1	1	1	1"=80'	SWXXXX	19739		0



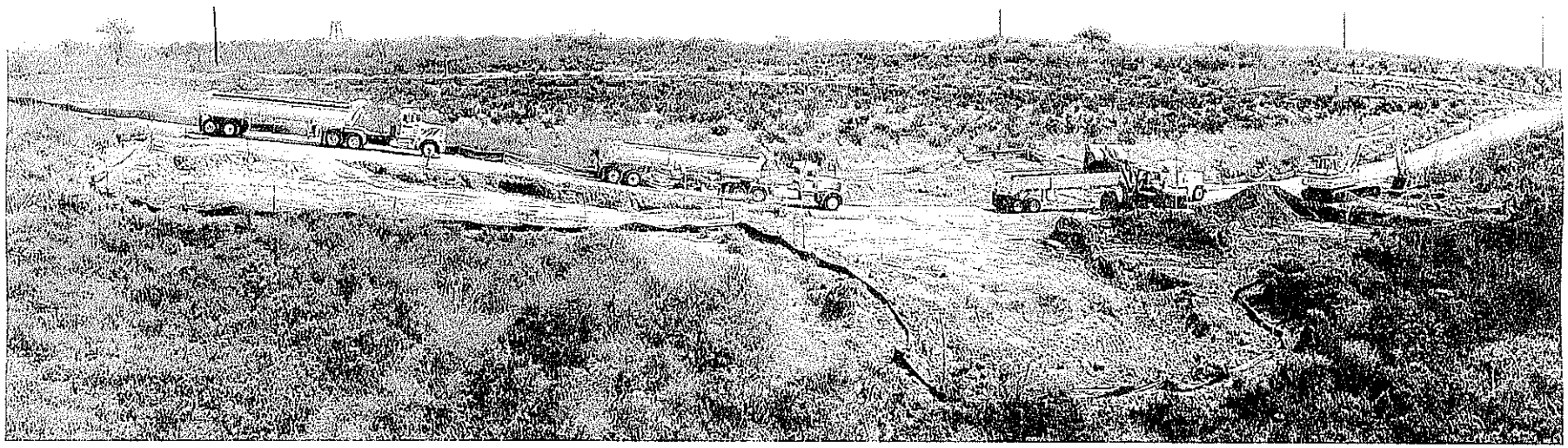
Photograph No. 1: Site 1E Before Soil Removal Activities (August 16, 1999)
Photo Control Location (PCL) #3



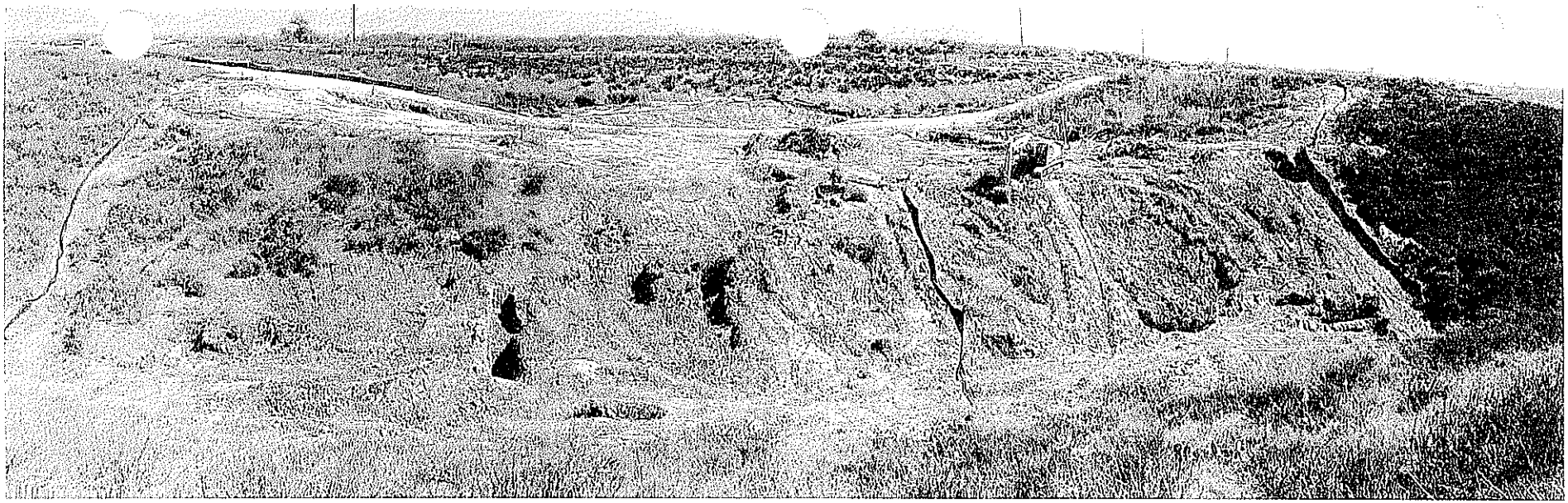
Photograph No. 2: Site 1E Clearing And Grubbing (August 18, 1999)
PCL # 1



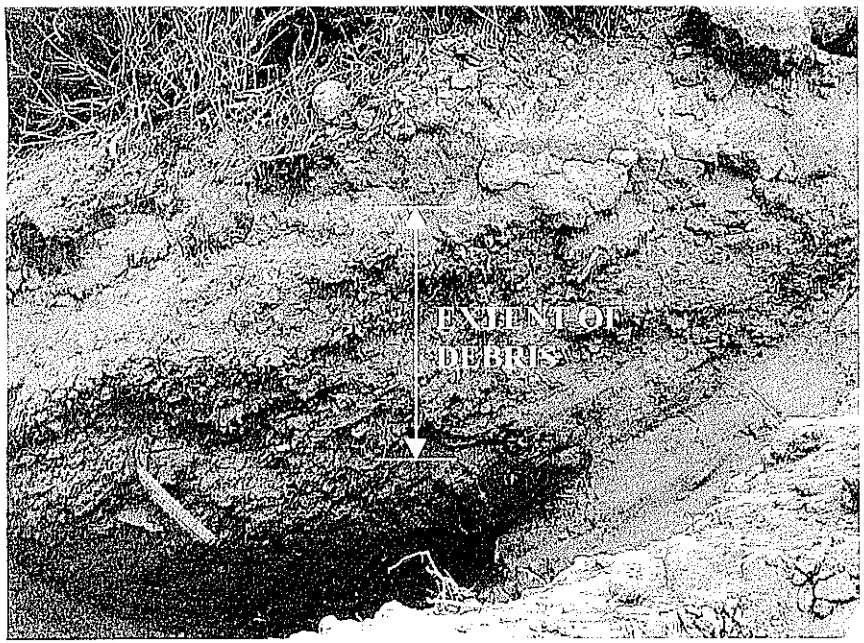
Photograph No. 3: Site 1E Planned Depth Excavating and Stockpiling Activities (August 24, 1999)
PCL # 3



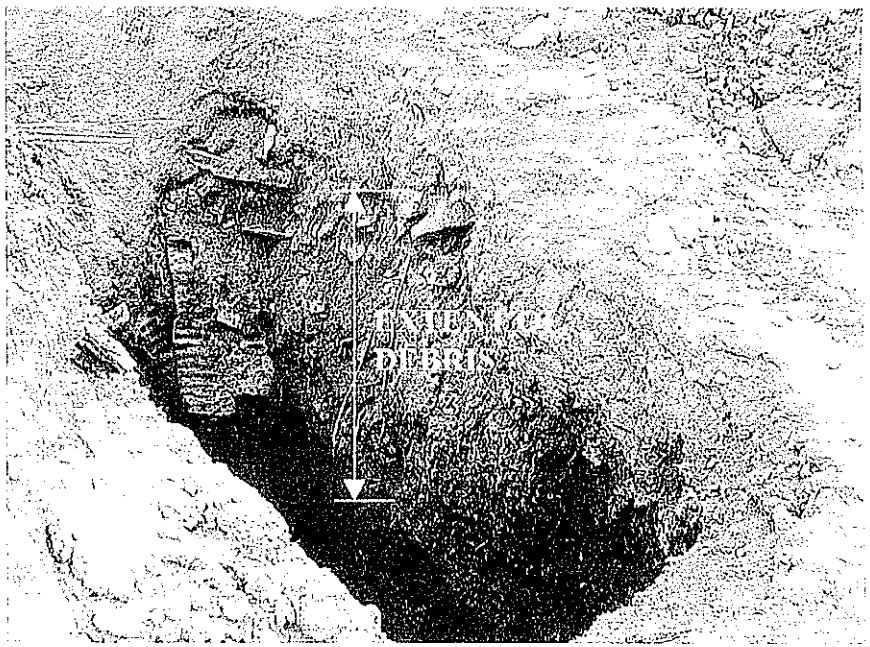
Photograph No. 4: Last Day of Loading Contaminated Soil from Planned Excavation for Transport to CAMU (August 27, 1999)
PCL # 3



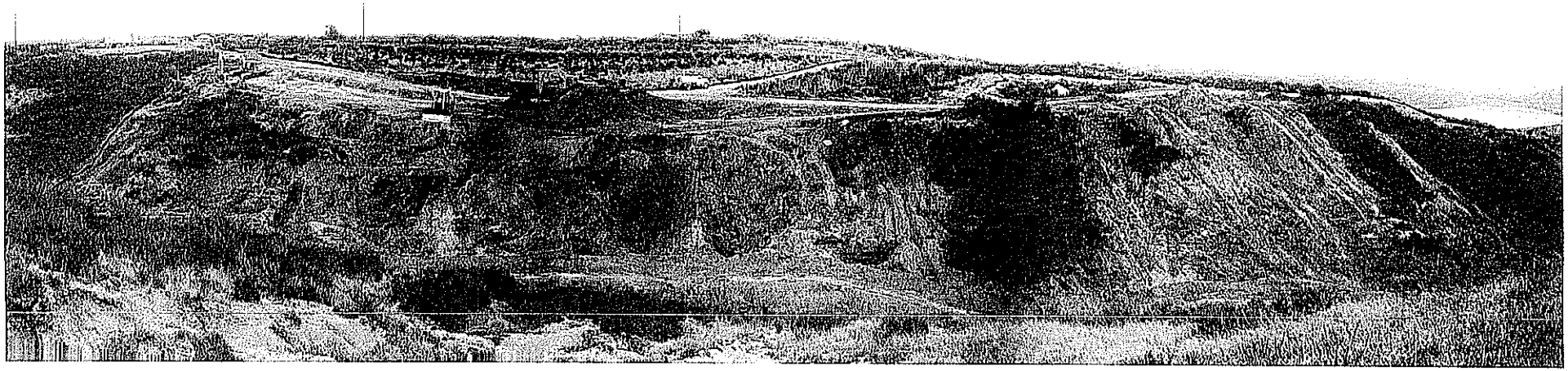
Photograph No. 5: Site 1E Test Trenching Activities Western Slope (September 10,199)
PCL # 3



Photograph No. 6: View of Debris During Trenching

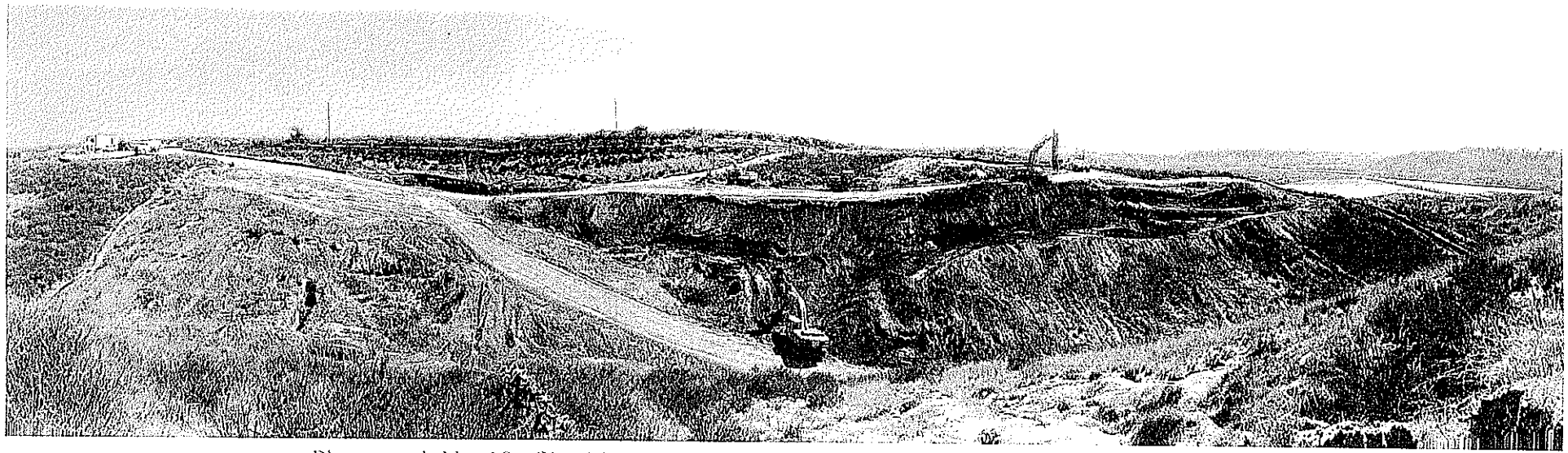


Photograph No. 7: View of Debris During Trenching

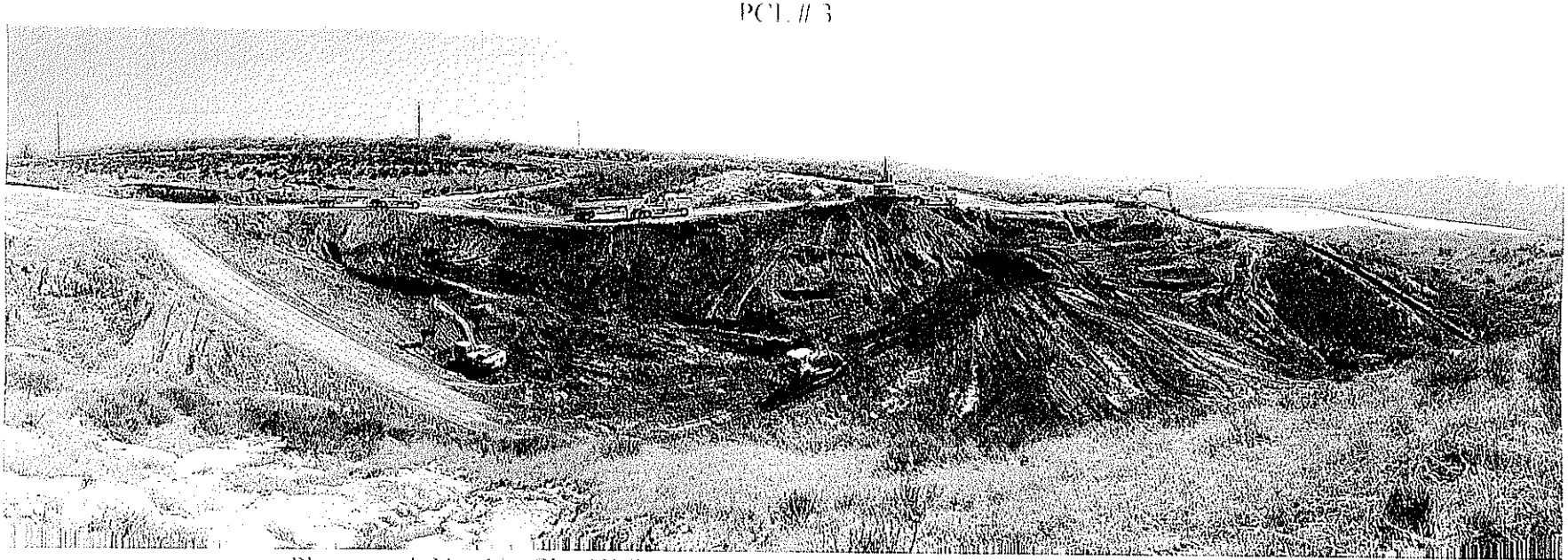


Photograph No. 8: Site 1E First Day of Overexcavation Activities Outside Planned Boundary (September 17, 1999)
PCL # 3

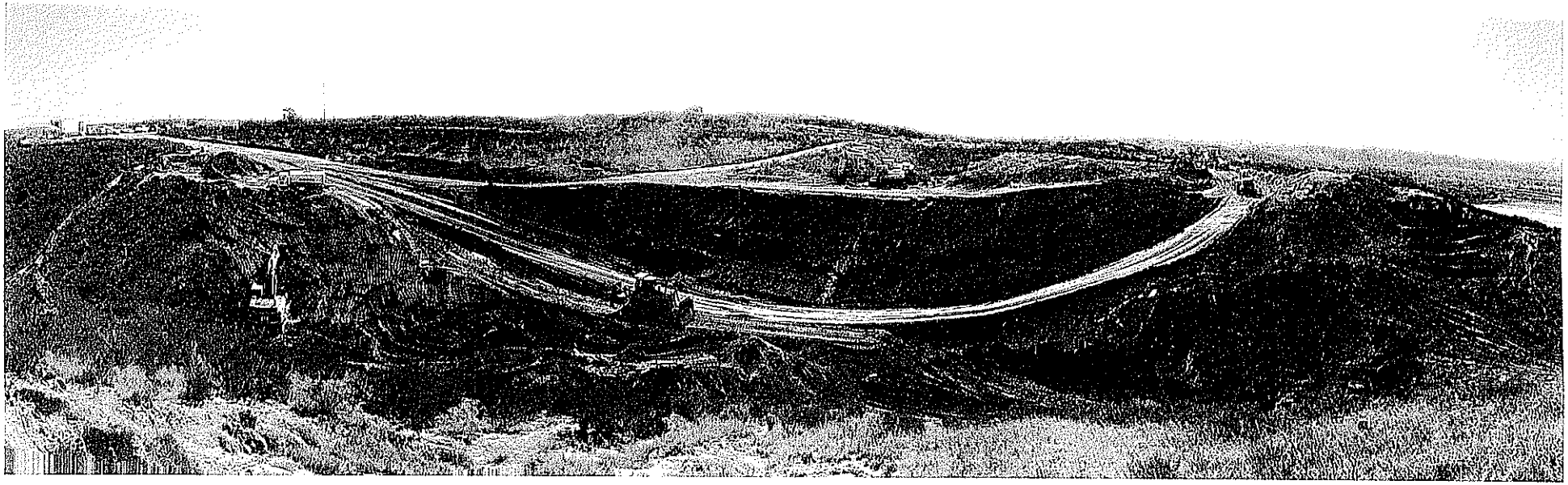
Photograph No. 9: Site 1E Overexcavation and Stockpiling Operations (September 22, 1999)
PCL # 3



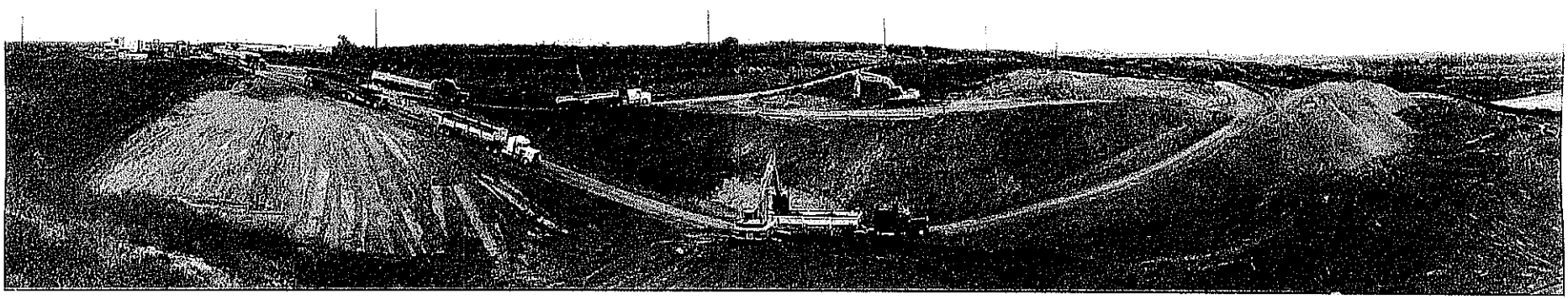
Photograph No. 10: Site 1E Overexcavation Activities in Progress (September 29, 1999)
PCL # 3



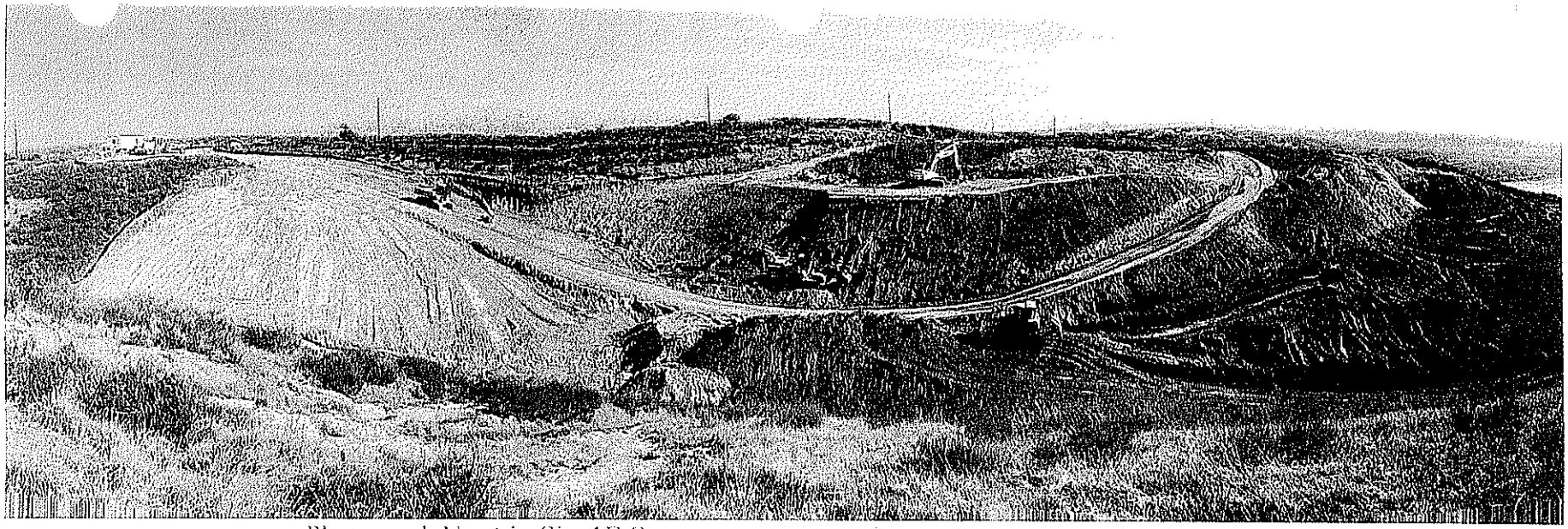
Photograph No. 11: Site 1E Overexcavation Activities in Progress (October 5, 1999)
PCL # 3



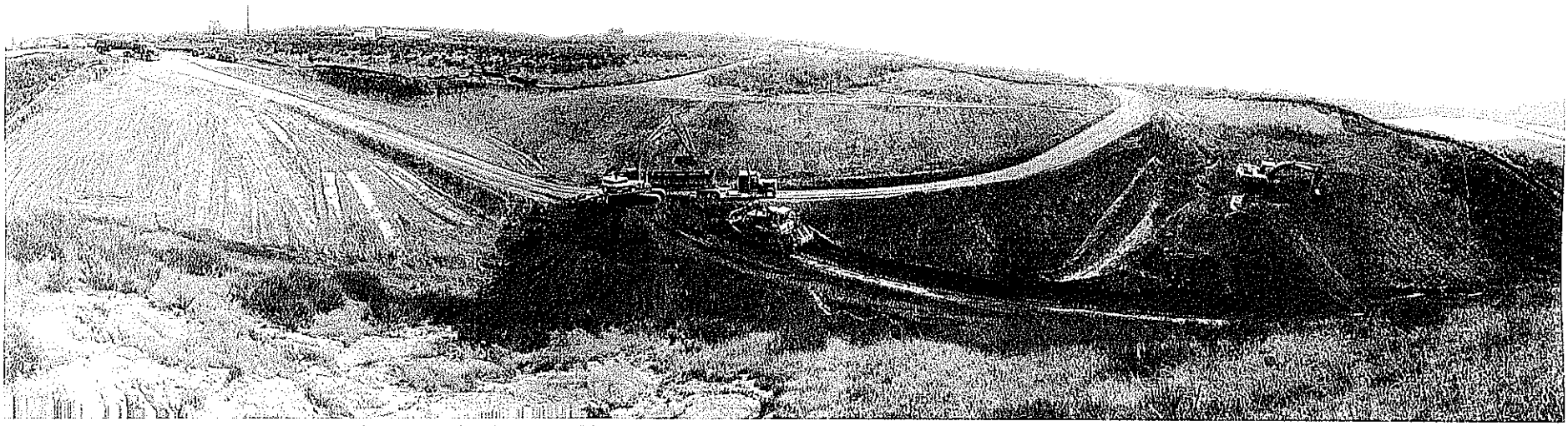
Photograph No. 12: Site 1E Slope Haul Road Construction Activities (October 8, 1999)
PCL # 3



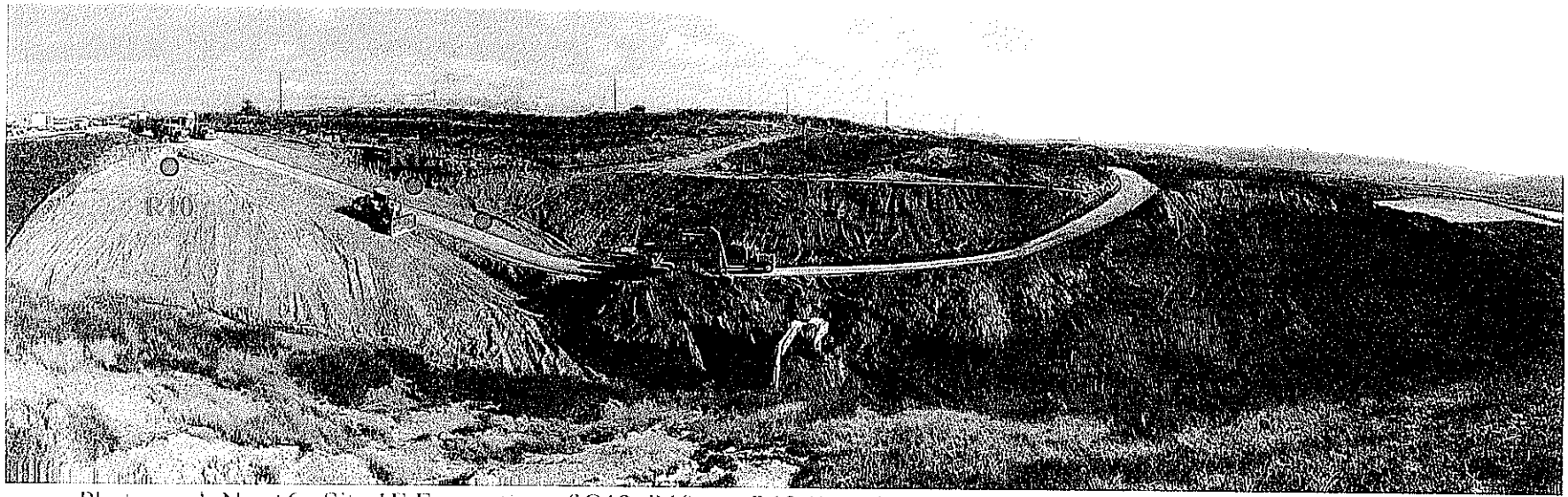
Photograph No. 13: Site 1E Overexcavation Activities in Progress (October 15, 1999)
PCL # 3



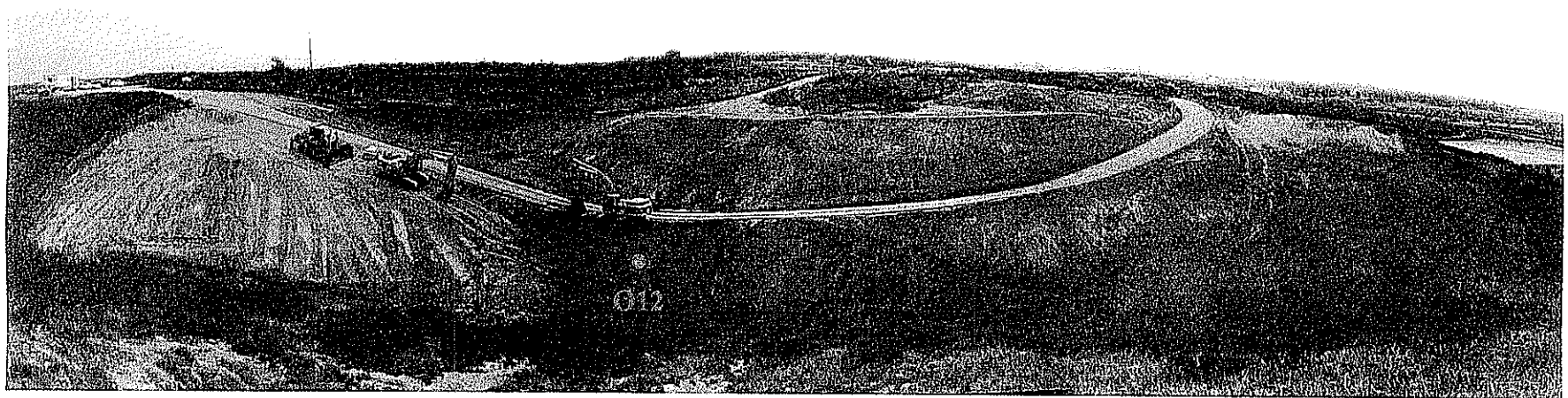
Photograph No. 14: Site 1E Overexcavation Activities in Progress (October 22,1999)
PCL # 3



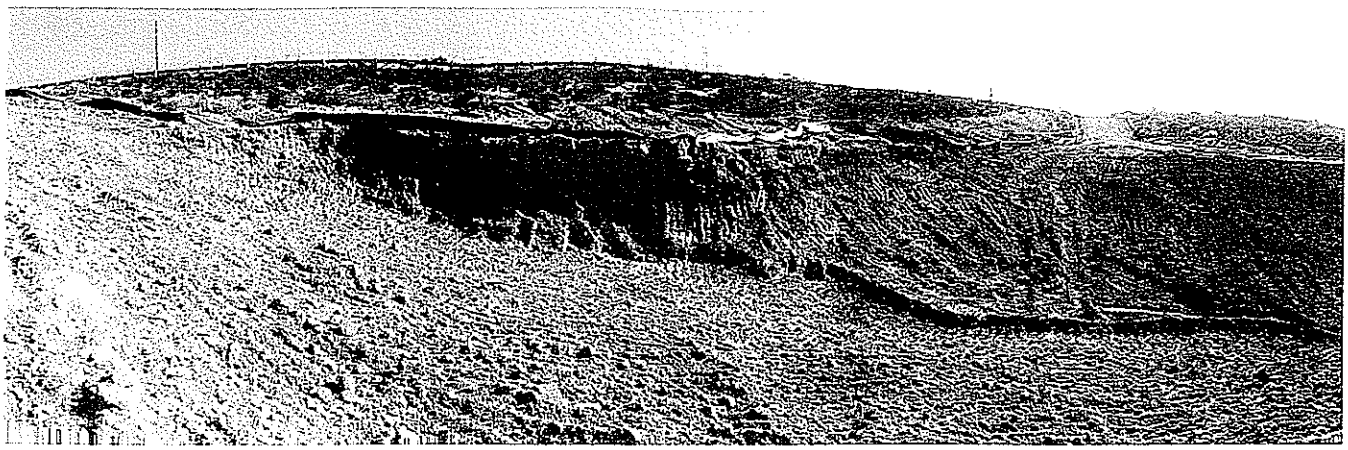
Photograph No. 15: Site 1E Overexcavation of Canyon Floor (November 5,1999)
PCL # 3



Photograph No. 16: Site 1E Excavation of Q12, R10 and R12 Complete; Overexcavation Continues (November 17,1999)
PCL # 3



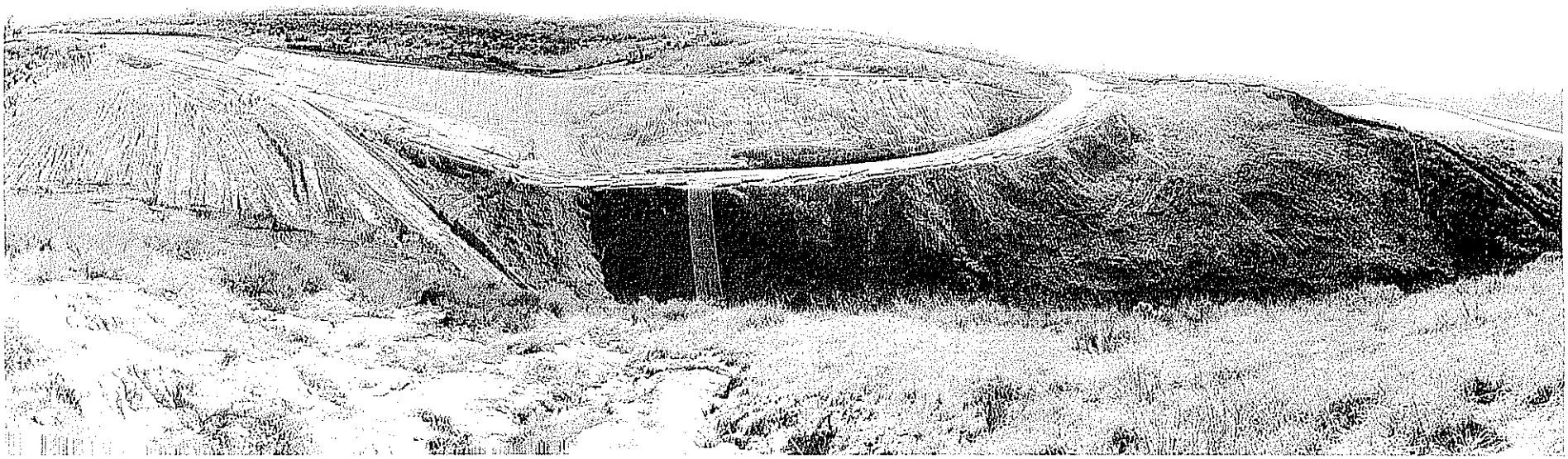
Photograph No. 17: Site 1E Overexcavation Activities for 1999 Completed (November 19,1999)
PCL # 3



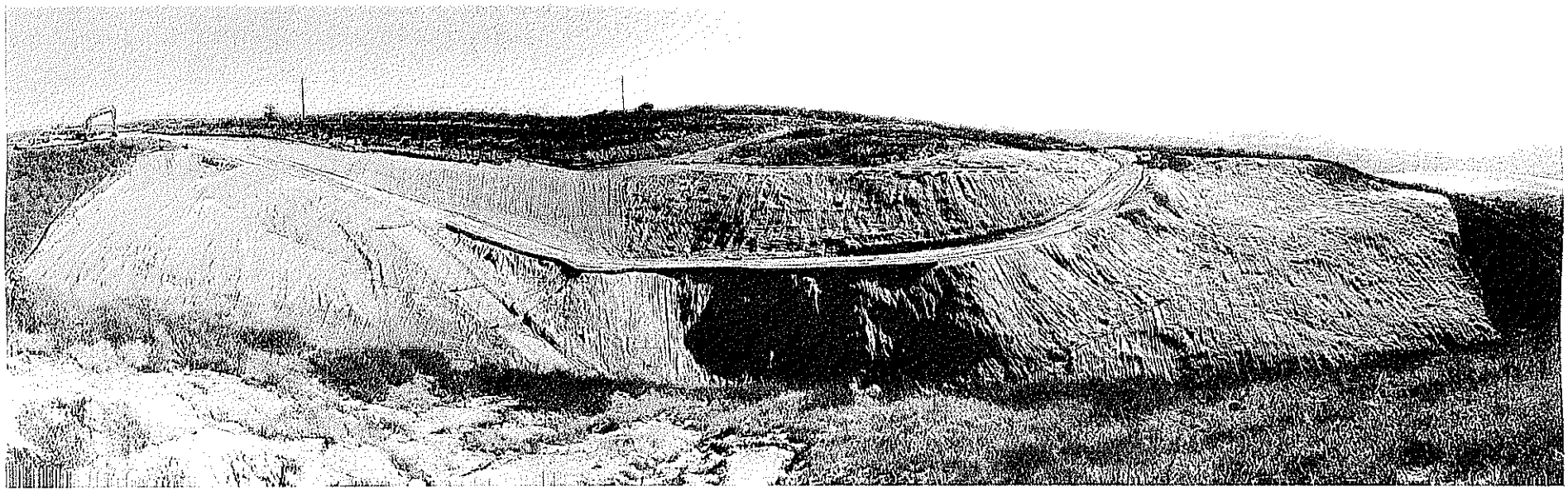
Photograph No. 18: Site 1E Area Requiring Structural Backfill (November 11,1999)

Photograph No. 19: Site 1E Backfilling, Compacting, and Testing (December 01,1999)

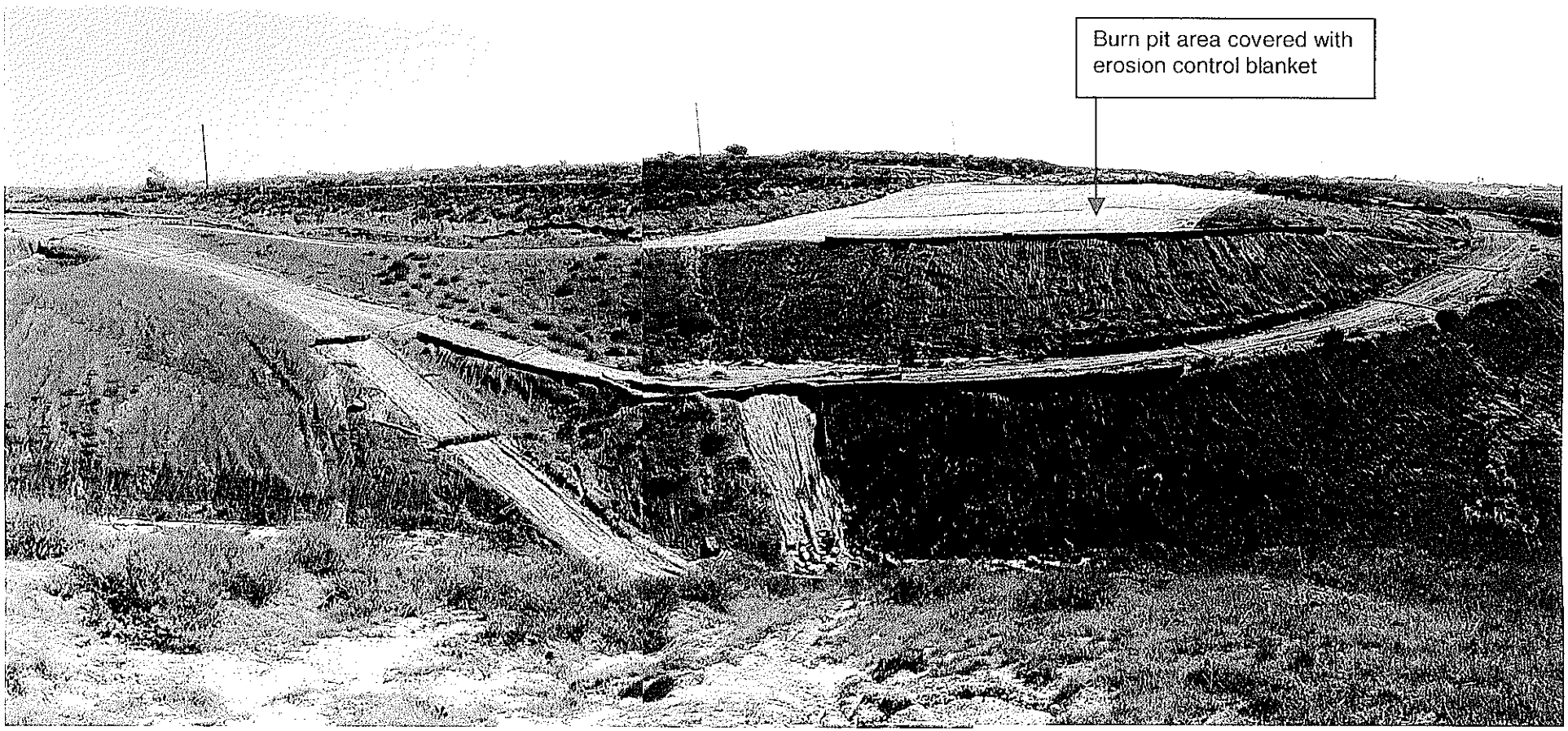
Photograph No. 20: Site 1E Backfilling and Grading Completed (December 08, 1999)



Photograph No. 21: Site 1E Winterization Second Day of Erosion Control Mat Installation (December 10, 1999)
PCL #3



Photograph No. 22: Site 1E Winterization Installation Completed (December 17, 1999)
PCL #3



Photograph No. 23: Site 1E After Final Site Restoration and One Year After Completion of Remedial Excavation (January 9, 2001). Notice newly installed riprap down-drain (center of the site) and erosion control cover over the old burn area (upper right of the site).
PCL #3

APPENDIX C
SITE BACKFILL GEOTECHNICAL CONTRACTOR QUALITY CONTROL REPORT

January 7, 2000
Project No. 103067-13

Mr. Max Pan
OHM Remediation/IT Group
1202 Kettner Blvd., Suite 3400
San Diego, California 92101

Subject: Summary of Earthwork Observation and Compaction Testing Services for the MCB Site 1E Camp Pendleton, California

INTRODUCTION

In accordance with your request, Ninyo and Moore's field representatives have provided geotechnical observations and compaction testing services during the earthwork operations at the MCB Site 1E. The purpose of our services was to observe and test the placement of backfill material. We performed field and laboratory tests of representative soil samples to evaluate relative compaction of the backfill placed at the site. Our findings and conclusions are presented herein.

EARTHWORK OPERATIONS

Earthwork operations commenced on November 29, 1999, and were completed on December 7, 1999. Our field technicians were generally on site full-time during the soil fill placement.

During the earthwork operations, the contractor used a combination of earthmoving and compaction equipment to achieve the project specifications. Generally, a blade, a sheepsfoot roller wheel, a loader, excavators, and a water truck were used to perform the earthwork operations.

In preparation for the soil fill placement operation, on-site and import materials were processed and moisture conditioned using a water truck or water hose. The material was then placed in approximately 10 to 12 inch lifts and compacted using a loader with a sheepsfoot roller.

FIELD AND LABORATORY TESTING

Field density tests were performed by our technicians during the earthwork operations in general accordance with ASTM D2922-91 and D3017-88 (Nuclear Gauge Method). The results of the field density tests are presented in Table 1, Summary of Field Density Tests for Project No. 103067-13. Descriptions of the locations of the density tests are presented in Table 1.

During the fill placement operations, when a field density test was performed that resulted in less than the specified relative compaction, the area was generally reworked and a retest performed. The specified relative compaction for the backfill operation was 90 percent per the direction of the quality control manager on site

Laboratory tests were performed on representative samples of the fill materials to evaluate maximum dry density, optimum moisture content, and sieve analysis Maximum dry density and optimum moisture content tests were performed in general accordance with ASTM D1557-91. The results of the maximum dry density and optimum moisture content tests are presented in Table 2 Sieve analysis tests were performed in general accordance with ASTM D 422-63, and the results are presented in Table 3

SUMMARY

Our field technician was generally on-site full time during the backfill placement operations. The field density tests performed during the backfill operations indicated the specified relative compaction or greater, after testing reworked areas. Based on our observations and the results of our field and laboratory tests, it is our opinion that the backfill operations were performed in general accordance with the current standard of practice.

LIMITATIONS

The geotechnical services outlined in this report have been conducted in accordance with current practice and standard of care exercised by geotechnical consultants performing similar tasks in this area. No warranty, expressed or implied, is made regarding the opinions presented in this report. The reported test results represent the relative compaction at the location tested. It is im-

portant to note that the precision of field density tests is not exact and variations should be expected. The reported locations and elevations of the density tests are estimated based on correlation given by the client's engineer. Further accuracy is not implied.

We appreciate this opportunity to be of service. If you should have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
NINYO & MOORE

Luis A. Labrada
Staff Engineer

Mark Cuthbert, P.E.
Principal Engineer

LAL/MC/lal

Attachments: Table 1 – Summary of Field Density Tests for Project No. 103067-13
Table 2 – Maximum Density Test Results
Table 3 – Sieve Analysis Test Results

Explanation of Summary of Field Density Tests

Test No.: 1# Field Density Test by nuclear Method (ASTM D2922-91 and D3017-88)

Test No.: CF Compacted Fill

NOTE: Description of Soil Types are presented in Table 2.

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TABLE 1
PAGE 1

SUMMARY OF FIELD DENSITY TESTS FOR PROJECT NO. 103067-13 COMPACTED FILL

Test No.	Date	Test of	Test Location	Approx Elev. (ft)	Moisture Content		Dry Density		Relative Compaction		Soil Type No.	Remarks
					Field (%)	Opt. (%)	Field (pcf)	Max. (pcf)	Tested (%)	Spec. (%)		
1#	11/29/99	CF	NORTH SIDE OF EXCAVATION	125.0	8.6	6.7	128.5	142.6	90	90	4	
2#	11/30/99	CF	SOUTH SIDE OF EXCAVATION	126.0	9.0	10.0	117.6	127.6	92	90	8	
3#	11/30/99	CF	NORTH SIDE OF EXCAVATION	126.0	8.8	7.3	125.1	137.8	91	90	9	
4#	11/30/99	CF	SOUTHWEST SIDE OF EXCAVATION	128.0	8.8	7.3	125.2	137.8	91	90	9	
5#	11/30/99	CF	MIDDLE SITE OF EXCAVATION, 50'N OF SOUTH BOUNDARY	128.0	7.5	7.3	128.9	137.8	94	90	9	
6#	11/30/99	CF	NORTHEAST SIDE OF EXCAVATION	128.0	6.9	7.3	125.0	137.8	91	90	9	
7#	11/30/99	CF	SOUTHEAST CORNER OF EXCAVATION	128.0	8.4	7.3	132.1	137.8	96	90	9	
8#	11/30/99	CF	30'N OF SOUTHEAST CORNER OF EXCAVATION	130.0	9.8	7.3	128.5	137.8	93	90	9	
9#	11/30/99	CF	10'W OF EAST BOUNDARY 80'N	130.0	8.9	7.3	134.3	137.8	97	90	9	
10#	11/30/99	CF	10'W OF EAST BOUNDARY OF EXCAVATION	130.0	9.6	7.3	126.0	137.8	91	90	9	
11#	11/30/99	CF	NORTHEAST CORNER OF EXCAVATION	132.0	7.1	7.3	128.7	137.8	93	90	9	
12#	11/30/99	CF	SOUTHEAST CORNER OF EXCAVATION	132.0	9.0	7.3	119.6	137.8	87	90	9	RETEST ON 14#
13#	11/30/99	CF	SOUTHWEST CORNER OF EXCAVATION	132.0	9.7	7.3	127.4	137.8	92	90	9	
14#	12/1/99	CF	SOUTHWEST CORNER OF EXCAVATION	132.0	8.9	7.3	124.6	137.8	90	90	9	RETEST OF 12#
15#	12/1/99	CF	SOUTHEAST CORNER OF EXCAVATION	132.0	8.9	7.3	133.2	137.8	97	90	9	
16#	12/1/99	CF	EAST SIDE CORNER OF EXCAVATION	134.0	8.3	7.3	122.8	137.8	89	90	9	RETEST ON 17#
17#	12/1/99	CF	EAST SIDE CORNER OF EXCAVATION	134.0	7.9	7.3	125.1	137.8	91	90	9	RETEST OF 16#
18#	12/1/99	CF	SOUTHWEST CORNER OF EXCAVATION	134.0	9.0	7.3	127.9	137.8	93	90	9	
19#	12/1/99	CF	NORTHWEST CORNER OF EXCAVATION	134.0	7.8	7.3	135.2	137.8	98	90	9	
20#	12/1/99	CF	NORTHWEST CORNER OF EXCAVATION	134.0	8.2	7.3	129.0	137.8	94	90	9	
21#	12/1/99	CF	NORTH OF SOUTH CORNER OF EXCAVATION	134.0	8.8	7.3	129.5	137.8	94	90	9	
22#	12/1/99	CF	SOUTH SIDE OF EXCAVATION	134.0	8.8	7.3	129.5	137.8	94	90	9	
23#	12/1/99	CF	40'W OF EAST BOUNDARY, 30'N OF SOUTH BOUNDARY	135.0	8.7	7.3	127.3	137.8	92	90	9	
24#	12/1/99	CF	SOUTHEAST CORNER OF EXCAVATION	135.0	8.7	7.3	127.6	137.8	93	90	9	
25#	12/2/99	CF	SOUTHEAST CORNER OF EXCAVATION	137.0	9.4	7.3	126.3	137.8	92	90	9	
26#	12/2/99	CF	SOUTHEAST CORNER OF EXCAVATION	138.0	9.0	7.3	126.6	137.8	92	90	9	
27#	12/2/99	CF	SOUTHEAST CORNER OF EXCAVATION	139.0	8.2	6.7	133.4	142.6	94	90	4	
28#	12/2/99	CF	SOUTHEAST CORNER OF EXCAVATION	140.0	9.1	7.3	127.5	137.8	93	90	9	
29#	12/2/99	CF	NORTHEAST CORNER OF EXCAVATION	140.0	11.7	10.0	116.4	127.6	91	90	8	
30#	12/2/99	CF	NORTHEAST CORNER OF EXCAVATION	142.0	9.9	10.0	115.7	127.6	91	90	8	
31#	12/3/99	CF	SOUTHEAST CORNER OF EXCAVATION	143.0	9.9	10.0	115.8	127.6	91	90	8	
32#	12/3/99	CF	NORTHEAST CORNER OF EXCAVATION	143.0	11.0	10.0	123.6	127.6	97	90	8	
33#	12/3/99	CF	10'E OF NORTH BOUNDARY, 10'N OF BOUNDARY	144.0	11.8	10.0	123.4	127.6	97	90	8	
34#	12/6/99	CF	SOUTHEAST CORNER OF EXCAVATION	145.0	7.1	10.0	117.9	127.6	92	90	8	
35#	12/6/99	CF	SOUTHEAST CORNER OF EXCAVATION	145.0	6.9	10.0	119.1	127.6	93	90	8	
36#	12/6/99	CF	SOUTHEAST CORNER OF EXCAVATION	145.0	10.0	10.0	116.2	127.6	91	90	8	
37#	12/7/99	CF	SOUTHEAST CORNER OF EXCAVATION	143.0	8.4	10.0	105.3	127.6	83	90	8	RETEST ON 38#
38#	12/7/99	CF	SOUTHEAST CORNER OF EXCAVATION	143.0	7.7	10.0	118.5	127.6	93	90	8	RETEST OF 37#
39#	12/7/99	CF	SOUTHEAST CORNER OF EXCAVATION	143.0	9.0	10.0	118.5	127.6	93	90	8	
40#	12/7/99	CF	SOUTHEAST CORNER OF EXCAVATION	143.0	7.5	10.0	124.5	127.6	98	90	8	

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TABLE 1
PAGE 2

SUMMARY OF FIELD DENSITY TESTS FOR PROJECT NO. 103067-13 COMPACTED FILL

Test No.	Date	Test of	Test Location	Approx Elev. (ft)	Moisture Content		Dry Density		Relative Compaction		Soil Type No.	Remarks
					Field (%)	Opt. (%)	Field (pcf)	Max. (pcf)	Tested (%)	Spec. (%)		
41#	12/7/99	CF	W. OF SLOPE, 40'N FROM S CORNER	141.0	8.4	10.0	105.3	127.6	83	90	8	RETEST ON 42#
42#	12/7/99	CF	W. OF SLOPE, 40'N FROM S CORNER	141.0	7.7	10.0	118.3	127.6	93	90	8	RETEST OF 41#
43#	12/7/99	CF	W. OF SLOPE, 10'N FROM S CORNER	143.0	9.0	10.0	118.5	127.6	93	90	8	
44#	12/7/99	CF	W. OF SLOPE, 80'N FROM S CORNER	143.0	7.5	10.0	124.5	127.6	98	90	8	
45#	12/7/99	CF	20'W. FROM TOP OF SLOPE, 20'N FROM S CORNER	143.0	8.2	10.0	118.3	127.6	93	90	8	
46#	12/7/99	CF	20'W. FROM TOP OF SLOPE, 40'N FROM S CORNER	143.0	8.4	10.0	114.3	127.6	90	90	8	
47#	12/7/99	CF	E OF SLOPE, 5' W & 30'N OF BOUNDARY	143.0	8.5	10.0	117.2	127.6	92	90	8	

Table 2 – Maximum Density Test Results

Soil Type No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
3	Dark Grayish Brown Silty SAND	115.1	12.9
4	Olive Silty SAND with Gravel	142.6	6.7
7	Yellowish Clayey SAND	124.0	10.0
8	Brown Clayey SAND	127.6	10.0
9	Olive Clayey SILT with Gravel	137.8	7.3

Table 3 – Sieve Analysis Test Results

Sieve Size	Percent Passing		
	Soil Type No. 3	Soil Type No. 4	Soil Type No. 8
3"			100
2"		100	98
1-1/2"	100	99	97
1"	100	95	96
3/4"	100	92	96
1/2"	98	86	96
3/8"	97	82	95
#4	97	70	95
#8	93	59	90
#16	90	49	79
#30	86	41	64
#50	78	34	48
#100	58	28	38
#200	32	23	31

APPENDIX D
SITE REVEGETATION SEED MIX

Hydroseeding Specifications

Hydroseeding shall be used to establish ground cover and introduce an upland native seed mix to each site. Application of hydroseed shall begin no less than 30 days following the placement of soil amendments where required, unless otherwise directed by IT. The hydroseed mixture shall consist of the three parts described below:

- Upland native seed mix at a rate of 55 pounds per acre. The seed mix shall consist of the following:

Botanical Name	Common Name	Pounds/Acre	Purity/Germination
Artemisia californica	California Sage Brush	4	50/15
Encelia californica	Bush Sunflower	3	60/40
Eschschlozia californica	California Poppy	2	75/98
Lotus scoparius	Deerweed	8	60/90
Eriogonum fasciculatum	California Buckwheat	8	65/10
Lasthenia glabrata	Goldfields	2	85/90
Lupinus succulentus	Arroyo Lupine	4	85/90
Eriophyllum confertiflorum	Golden Yarrow	3	60/30
Salvia apiana	White Sage	4	50/70
Sisyrinchium bellum	Blue-Eyed Grass	1	75/95
Diplacus longiflor-us	Monkey Flower	2	55/2
Salvia mellifera	Black Sage	4	50/70
Nassella pulchra	Purple Needlegrass	2	70/60
Bromus arizonicus	Cucamonga Brome	5	95/80
Melica california	California Melic	3	90/60
	Total Pounds Per Acre	**55**	

- Fiber mulch at a rate of 2,000 pounds per acre.
- Organic soil stabilant (tackifier) at a rate of 140 pounds per acres.

The fiber mulch shall be a specifically prepared virgin wood cellulose fiber, which has been thermomechanically processed for specific use as hydromulch. The fiber mulch shall also contain non-toxic green dye to provide a gage for metering of material over ground surfaces. The tackifier shall be a non-toxic commercial product typically used for binding soil and mulch in erosion control seeding operations. The hydroseeding shall be performed from late October to late November before the start of the winter rainy season

Field Quality Control

The following activities will be performed by IT during the site restoration process:

- Visual inspections will be performed to verify that proper amount of compost (based on number of truck loads and surface area), gypsum, and fertilizer are applied and that they are thoroughly mixed with the upper six inch of backfill soil.

- Visual inspection of the hydroseeding process to verify that the proper amount of each of the components is applied.

- Document the visual inspection and all field activities in details. Take photographs as required to show the field conditions before, during, and after the revegetation effort.

Compile field documentation into the final site closure as-built report as required.

APPENDIX E
ANALYTICAL DATA SUMMARY AND EVALUATION

Data Evaluation – Operable Unit 3, Site 1E

E.1 Introduction

This report addresses the validity and quality of the data collected for soil excavation activity at Operable Unit (OU) 3, Site 1E located at Marine Corps Base (MCB) Camp Pendleton, San Diego County, California. Metals analytical data were reviewed and validated in accordance with a modified outline of the United States Environmental Protection Agency (US EPA) National Functional Guidelines for Inorganic and Data Review, December, 1994. The National Functional Guidelines, which are an outcome of the CERCLA and the CLP, were used as a framework for the validation of data generated using SW846 methodology

Laboratory data were subjected to a four-stage process of evaluation that included completeness checks, verification of hard copy and electronic results, third-party validation of the data, and final evaluation based on the best judgment of the project chemist.

The data from all final perimeter (wall) samples and final floor samples collected between October 1999 and March 2000 and data from the "hot spot" samples collected from December 1999 to December of 2000 were validated based on Level C or Level D (NFESC, 1996) guidelines.

Inorganic data were validated against the following criteria:

- holding times
- initial and continuing calibrations
- method blanks, initial and continuing blanks
- interference check standards A and B
- matrix spike/matrix spike duplicate (MS/MSD) recoveries and relative percent difference (RPD)
- laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries and RPD
- serial dilution spike recoveries
- duplicate field sample RPD
- result forms and laboratory logs
- field and quality control sample raw data (Level D only)

The laboratory was instructed to prepare data packages such that 90% met Level C requirements and 10% met Level D requirements.

Data qualification was based on the field and analytical protocols detailed in the *Draft Final Remedial Design and Remedial Action Work Plan, Marine Corps Base Camp Pendleton, California (OHM, May 1999)* Pertinent data qualifiers are defined as follows:

U: Analyte was analyzed for but not detected at or above the listed limit of detection
J: Analyte detected with uncertainty in the reported concentration
UJ: Analyte was not detected with uncertainty in the reported detection limit
R: Data are unusable (i.e , rejected)

Pertinent sample results and their associated data qualifiers are presented in Tables E-1 through E-3 of this report. Analytical services were provided by Applied Physics and Chemistry Laboratory in Chino, California. Data validation was performed by Laboratory Data Consultants, Inc., in Carlsbad, California

Although the QAPP lists EPA Method 7060A as the method for analyzing arsenic, the laboratory used EPA Method 6010A, which is a procedurally and technically satisfactory method. Furthermore, the level of detection was not compromised by using Method 6010A.

Results were reported to the instrument detection limit (IDL), rather than the reporting limit (RL), for antimony to help meet the Preliminary Remediation Goal (PRG). Results between the IDL and the RL have been assigned a "J" footnote.

E.2 Analytical Quality Control Program

This section provides a description of the field and laboratory quality control (QC) sample results, which were used to evaluate precision, accuracy, representativeness, completeness, and comparability (PARCC).

Precision

Precision was evaluated based on results from QC samples collected in the field and on results from QC samples generated in the laboratory. Analytical precision is assessed by calculating the RPDs of the LCS/LCSD and the MS/MSD. Total precision, which is a measure of variability as a function of field and analytical procedures, is assessed by calculating the RPD of the field duplicate samples. The RPD for MS/MSD or duplicate samples is not calculable when one or both results were not detected.

The precision results for all samples were within the required QC limits with the following exceptions:

Sample/Duplicate	Analyte	RPD (%)
19739-069/070	aluminum	63
	chromium	73
19739-624/625	antimony	105
	cadmium	56
	copper	78
	lead	139
	zinc	84
19739-844/845	cadmium	53
19739-920/921	lead	55
19739-966/967	cadmium	157
	copper	55
	lead	96
	zinc	54

Accuracy

Accuracy was evaluated based on the percent recovery of spiked analytes at known concentrations in MS/MSDs and LCS/LCSDs. In addition, evaluation of the initial and continuing calibration results provided information on analytical accuracy

Accuracy for all samples was within the required QC limits.

Representativeness

Representativeness is a qualitative parameter that is described by the degree of accuracy and precision of the sample data and their reflection on the environment from where the samples were collected, conditions present during sample collection, or the attributes of a sample population

The data presented in Tables E-1 through E-3 of this report were found to be representative.

Completeness

Completeness is determined by calculating the number of valid measurements (or results) for each matrix and analyte combination. (A valid result is one that has not been "R" qualified.) The formula for completeness is the number of valid measurements divided by the total number of measurements multiplied by 100. A particular set of data is considered complete if, at a minimum, 90% of soil samples or 95% of aqueous samples meet the completeness criterion.

The data presented in Tables E-1 through E-3 of this report were found to be complete.

Comparability

To ensure comparability, the Work Plan detailed specific procedures for both field and laboratory activities. Furthermore, the Work Plan required the laboratory to reference US EPA analytical methods, and all soil samples were reported on a dry weight basis.

No significant deviations from standard analytical protocols were reported by the laboratory.

E.3 Summary

The data associated with the excavation activities at Site 1E at MCB Camp Pendleton described in this report are usable and acceptable as qualified. Overall precision and accuracy objective were met. The analytical results with their associated qualifiers are summarized in Tables E-1 through E-3.

Table E-1
Summary of Hot Spot Sampling Results

Sample Identification		19739-955	19739-1019	19739-1020	19739-1022	19739-1025	19739-1027	19739-1134
Location Code		1E-O12-01	1E-012-A1	1E-012-A1D	1E-012-B1	1E-012-C1	1E-012-D1	1E-012-CS1*
Date Sampled		12/03/99	07/13/00	07/13/00	07/13/00	07/13/00	07/13/00	09/29/00
Depth (feet below ground surface)		0.5	2.0	2.0	2.0	2.0	2.0	0.5
	Unit							
Aluminum	mg/kg	16600 J	10800	11300	13900	11500	11600	NA
Antimony	mg/kg	0.11 U	4.8	0.98	0.076 U	0.082 U	0.31	0.17 U
Arsenic	mg/kg	3.0	3.8	3.1	7.3	2.6	3.9	2.7
Barium	mg/kg	NA	NA	NA	NA	NA	NA	135
Cadmium	mg/kg	1.1	1.0	0.39	1.3	0.006 U	0.19 J	0.51
Chromium	mg/kg	30.5	15.9	19.6	34.6	21.6	21.6	28.4
Cobalt	mg/kg	10.5	11.0	11.3	10.9	6.8	7.2	11.5
Copper	mg/kg	187	42.3	46.8	27.6	11.2	12.9	25.6
Iron	mg/kg	30100	31000	23200	23900	14900	23700	NA
Lead	mg/kg	60.8	28.2	35.3	4.8	3.2	5.4	29.5
Mercury	mg/kg	NA	NA	NA	NA	NA	NA	0.15 J
Selenium	mg/kg	NA	NA	NA	NA	NA	NA	1.4
Silver	mg/kg	NA	NA	NA	NA	NA	NA	0.032 U
Zinc	mg/kg	214	277	191	96.3	55.0	70.8	124
TCLP								
Arsenic	µg/L	NA	NA	NA	NA	NA	NA	7.1 J
Barium	µg/L	NA	NA	NA	NA	NA	NA	8.0 J
Cadmium	µg/L	NA	NA	NA	NA	NA	NA	0.98 U
Chromium	µg/L	NA	NA	NA	NA	NA	NA	1.5 J
Lead	µg/L	NA	NA	NA	NA	NA	NA	1.8 U
Mercury	µg/L	NA	NA	NA	NA	NA	NA	0.22 J
Selenium	µg/L	NA	NA	NA	NA	NA	NA	4.6 J
Silver	µg/L	NA	NA	NA	NA	NA	NA	1.2 U

Cleanup Standards[a] - Standards are based on background (B), preliminary limit of exposure (PLE), and preliminary remedial goals (PRG)

CS - Composite sample made of 4 randomly collected individual samples within the sampling grid.*

J - Estimated value

mg/kg - milligram per kilogram

NA - not analyzed

TCLP - Toxic Characteristic Leaching Procedure

U - less than the reporting limit

µg/L - micrograms per liter

Table E-1
Summary of Hot Spot Sampling Results

Sample Identification		19739-1135	19739-1137	19739-1138 (Dup)	19739-1139
Location Code		1E-012-CS2*	1E-012-R1	1E-012-R1D	1E-012-R2
Date Sampled		09/29/00	12/04/00	12/04/00	12/04/00
Depth (feet below ground surface)		0.5	0.5	0.5	2.0
	Unit				
Aluminum	mg/kg	NA	14800	15800	12500
Antimony	mg/kg	0.17 U	0.48 U	0.52 U	0.33 U
Arsenic	mg/kg	2.7	3.9	3.9	2.2
Barium	mg/kg	140	NA	NA	NA
Cadmium	mg/kg	0.49	0.60 J	0.85	0.22 J
Chromium	mg/kg	28.8	27.5	28.5	23.2
Cobalt	mg/kg	10.7	10.5	11.4	7.5
Copper	mg/kg	21.5	37.5	40.6	11.1
Iron	mg/kg	NA	24900	24000	19900
Lead	mg/kg	20.0	53.5	64.9	2.5
Mercury	mg/kg	0.12 J	NA	NA	NA
Selenium	mg/kg	1.4	NA	NA	NA
Silver	mg/kg	0.032 U	NA	NA	NA
Zinc	mg/kg	139	166	182	60.3
TCLP					
Arsenic	µg/L	6.7 J	NA	NA	NA
Barium	µg/L	6.9 J	NA	NA	NA
Cadmium	µg/L	0.98 U	NA	NA	NA
Chromium	µg/L	1.5 J	NA	NA	NA
Lead	µg/L	1.8 U	NA	NA	NA
Mercury	µg/L	0.23 J	NA	NA	NA
Selenium	µg/L	4.2 U	NA	NA	NA
Silver	µg/L	1.2 U	NA	NA	NA

Cleanup Standards[a] - Standards are based on background (B), preliminary limit of exposure (PLE), and preliminary remedial goals (PRG)
CS - Composite sample made of 4 randomly collected individual samples within the sampling grid*
J - Estimated value
mg/kg - milligram per kilogram
NA - not analyzed
TCLP - Toxic Characteristic Leaching Procedure
U - less than the reporting limit
µg/L - micrograms per liter

Table E-2
Summary of Perimeter (Wall) Confirmation Sampling Results

Sample Identification		19739-974	19739-976	19739-978	19739-980	19739-981 (Dup)	19739-983	19739-985	19739-986	19739-987
Location Code		1E-PS01-01	1E-PS02-01	1E-PS03-01	1E-PS04-01	1E-PS04-01D	1E-PS05-01	1E-PS06-01	1E-PS07-01	1E-PS08-01
Date Sampled		02/29/00	02/29/00	02/29/00	02/29/00	02/29/00	02/29/00	02/29/00	02/29/00	02/29/00
Depth (feet below ground surface)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Unit									
Aluminum	mg/kg	13400	18200	17100	8500	8220	15400	15000	19600	6430
Antimony	mg/kg	0.13 U	0.14 U	0.14 U	0.14 U	0.13 U	0.15 U	0.14 U	0.14 U	0.14 U
Arsenic	mg/kg	6.2	5.1	5.6	4.2	3.5	5.0	4.4	3.5	1.1
Cadmium	mg/kg	0.012 U	0.053 J	1.3	0.31	0.31	0.40	0.14 J	0.023 U	0.036 U
Chromium	mg/kg	24.2	28.6	33.2	17.6	16.8	27.3	24.3	25.0	8.5
Cobalt	mg/kg	9.6	10.9	14.0	9.3	6.4	8.6	10.5	10.6	5.7
Copper	mg/kg	10.7	16.8	21.4	9.1	8.7	18.9	13.7	11.0	4.4
Iron	mg/kg	20600 J	28000 J	31400 J	15000 J	13200	27200 J	25800 J	25000 J	9870 J
Lead	mg/kg	6.7	29.3	5.7	2.8	2.4	6.0	4.4	5.4	2.6
Zinc	mg/kg	43.1 J	70.2 J	77.9 J	47.2 J	42.7	76.1 J	58.8 J	54.7 J	26.3 J

Cleanup Standards[a] Standards are based on background (B), preliminary limit of exposure (PLE), and preliminary remedial goals (PRG)

J - Estimated value

mg/kg - milligram per kilogram

U - less than the reporting limit

Table E-2
Summary of Perimeter (Wall) Confirmation Sampling Results

Sample Identification		19739-964	19739-938	19739-858	19739-853	19739-075
Location Code		1EK13-01	1ER10-03	1ER11-01	1ER12-02	1E-1181
Date Sampled		12/03/99	11/12/99	10/27/99	10/21/99	12/09/98
Depth (feet below ground surface)		0.5	0.5	0.5	2.0	3.0
	Unit					
Aluminum	mg/kg	21500	22700	16900	18700	11000
Antimony	mg/kg	0.13 U	0.70 U	0.29 U	0.65 U	0.42 U
Arsenic	mg/kg	4.7	1.1 J	1.1 J	1.5	1.9
Cadmium	mg/kg	0.35	3.1	0.024 U	0.42 J	0.046 U
Chromium	mg/kg	35.8	31.6	29.9	32.0	14.2
Cobalt	mg/kg	15.7	29.0	10.9	9.7	4.3
Copper	mg/kg	22.7	18.6 J	17.9	14.8 J	3.8
Iron	mg/kg	34100	23800	24000	25800	11100
Lead	mg/kg	5.4	7.2 J	3.0	4.5	5.5
Zinc	mg/kg	94.4	95.5	73.6	71.4	15.4

Cleanup Standards[a] - Standards are based on background (B), preliminary limit of exposure (PLE), and preliminary remedial goals (PRG)

J - Estimated value

mg/kg - milligram per kilogram

U - less than the reporting limit

Table E-3
Summary of Floor Confirmation Sampling Results

Sample Identification		19739-927	19739-920	19739-962	19739-925	19739-917	19739-958	19739-923	19739-969	19739-953	19739-960
Location Code		1EK14-01	1EK15-01	1EL13-01	1EL14-01	1EL15-01	1EM13-01	1EM14-01	1EM15-01	1EN12-01	1EN13-01
Date Sampled		11/11/99	11/11/99	12/03/99	11/11/99	11/11/99	12/03/99	11/11/99	12/03/99	12/03/99	12/03/99
Depth (feet below ground surface)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Unit										
Aluminum	mg/kg	11900	18900	10400 J	20400	18900	18100 J	19400	18200	10700 J	14100 J
Antimony	mg/kg	0.63 U	0.64 U	0.11 U	0.70 U	0.68 U	0.12 U	0.69 U	0.12 U	0.12 U	0.12 U
Arsenic	mg/kg	2.5 J	2.0 J	2.8	3.7 J	3.3 J	3.9	12.0 J	4.5	3.3	3.8
Cadmium	mg/kg	0.80 J	0.043 U	0.71	1.1	2.5	0.77	0.35 J	0.20 J	0.36	0.37
Chromium	mg/kg	23.1	30.6	19.7	32.9	34.7	29.9	40.5	35.9	20.6	27.1
Cobalt	mg/kg	10.7	11.5	6.9	9.2	16.2	11.2	8.7	19.3	7.9	10.5
Copper	mg/kg	11.1	13.8	10.7	20.4	18.3	17.0	24.4	18.9	10.3	13.6
Iron	mg/kg	20000	27900	15100	30900	30100	27500	39300	35800	16700	23900
Lead	mg/kg	1.3 J	2.1	2.5	4.7	4.3	3.9	7.1	4.1	2.8	3.3
Zinc	mg/kg	54.6	84.6	40.9	88.7	85.8	77.0	74.2	91.6	51.3	69.6

Cleanup Standards[a] - Standards are based on background (B), preliminary limit of exposure (PLE), and preliminary remedial goals (PRG)

J - Estimated value

mg/kg - milligram per kilogram

U - less than the reporting limit

Table E-3
Summary of Floor Confirmation Sampling Results

Sample Identification		19739-933	19739-850	19739-1137	19739-931	19739-929	19739-844	19739-842	19739-848	19739-966	19739-864
Location Code		1EN14-01	1EO11-01	1EO12-R1	1EO13-01	1EO14-01	1EP9-01	1EP10-01	1EP11-01	1EP12-01	1EP13-01
Date Sampled		11/11/99	10/21/99	12/04/00	11/11/99	11/11/99	10/21/99	10/21/99	10/21/99	12/03/99	10/27/99
Depth (feet below ground surface)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Unit										
Aluminum	mg/kg	23900	20100	14800	15200	21200	15300	6440	17600	15300 J	9020
Antimony	mg/kg	0.69 U	0.66 U	0.48 U	0.60 U	0.62 U	0.59 U	0.58 U	0.68 U	0.11 U	0.29 U
Arsenic	mg/kg	3.8 J	1.1 J	3.9	4.6 J	0.46 J	1.7	1.1 J	1.7	2.0	5.7
Cadmium	mg/kg	0.047 U	0.94 U	0.60 J	0.17 J	0.042 U	0.14 J	0.066 U	0.047 U	0.023 J	0.94
Chromium	mg/kg	48.4	33.1	27.5	26.8	37.3	24.5	17.3	31.4	27.5	21.1
Cobalt	mg/kg	11.8	9.9	10.5	9.2	12.5	9.0	8.8	9.1	8.0	6.8
Copper	mg/kg	29.3	17.1	37.5	14.7	18.7	25.3	5.3	17.4	14.9	10.1
Iron	mg/kg	47400	26100	24900	24800	30300	19000	9170	27600	26800	20400
Lead	mg/kg	4.1	7.6	53.5	6.5	6.8	6.5	2.9	4.9	5.2	2.5
Zinc	mg/kg	113	84.4	166	63.7	97.4	58.8	48.8	79.7	65.1	46.9

Cleanup Standards[a] - Standards are based on background (B), preliminary limit of exposure (PLE and preliminary remedial goals (PRG)

J - Estimated value

mg/kg - milligram per kilogram

U - less than the reporting limit

Table E-3
Summary of Floor Confirmation Sampling Results

Sample Identification		19739-838	19739-840	19739-935	19739-854	19739-938	19739-858	19739-853
Location Code		1EQ10-01	1EQ11-01	1EQ12-03	1EQ13-01	1ER10-03	1ER11-01	1ER12-02
Date Sampled		10/21/99	10/21/99	11/12/99	10/21/99	11/12/99	10/27/99	10/21/99
Depth (feet below ground surface)		0.5	0.5	3.7	0.5	0.5	0.5	2.0
	Unit							
Aluminum	mg/kg	22400	18100	18800	9630	22700	16900	18700
Antimony	mg/kg	0.75 U	0.65 U	0.67 U	0.62 U	0.70 U	0.29 U	0.65 U
Arsenic	mg/kg	3.8	5.2	5.0 J	2.0	1.1 J	1.1 J	1.5
Cadmium	mg/kg	1.1 U	6.2	0.046 U	0.17 J	3.1	0.024 U	0.42 J
Chromium	mg/kg	29.0	38.7	34.5	18.6	31.6	29.9	32.0
Cobalt	mg/kg	6.9	9.1	9.3	4.3	29.0	10.9	9.7
Copper	mg/kg	17.0	22.6	17.3 J	8.5	18.6 J	17.9	14.8 J
Iron	mg/kg	25400	37200	31600 J	15800	23800	24000	25800
Lead	mg/kg	12.0	5.0	5.3	2.6	7.2 J	3.0	4.5
Zinc	mg/kg	73.5	473	68.3	36.5	95.5	73.6	71.4

Cleanup Standards[a] - Standards are based on background (B), preliminary limit of exposure (PLE and preliminary remedial goals (PRG)

J - Estimated value

mg/kg - milligram per kilogram

U - less than the reporting limit

COMPLETED 12/21/98

OHM Remediation Services Corp
Subsidiary of OHM Corporation
U.S. Route 224 East • Findlay, Ohio 45840 • (419) 423-3526

CHAIN-OF-CUSTODY RECORD

page 1 of 3

PROJECT DATA MANAGER'S COPY

213759

FORM 0019 REV. 2-97

OHM's LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
Dwayne Ishida	949·263·9124·525	949·475·5433	986769		
PROJECT NAME: Camp Pendleton	PROJECT LOCATION: Site 1E	PROJECT NUMBER: 19739	LABORATORY PHONE	LABORATORY FAX	RECIPIENT NAME
PROJECT CONTACT: Dwayne Ishida	PROJECT PHONE NUMBER: as above	PROJECT FAX: 949·263·1147	LABORATORY ADDRESS		ADDRESS
PROJECT ADDRESS: 2031 Main street	CITY, STATE AND ZIPCODE: IRVINE CA	CLIENT: USNAVY SWDIV	CITY, STATE AND ZIPCODE		CITY, STATE AND ZIPCODE
PROJECT MANAGER: MAX DAN	PROJECT MANAGER'S PHONE: 949·263·9124·522	PROJECT MANAGER'S FAX: 949·263·1147			

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont	QC Level	T.A.T.	Analyses: Metals	Comments
1	19739-065	Soil	12/9/98	0802	—	1		5day	X	Site 1E
2	19739-066	Soil	12/9/98	0806	—	1		5day	X	
3	19739-067			0822	—	1			X	
4	19739-068			0823	—	1			X	
5	19739-069			0915	—	1			X	
6	19739 070			0916	—	1			X	
7	19739 071			0918	—	1			X	
8	19739 072			0950	—	1			X	
9	19739 073			0955	—	1			X	
10	19739 074	Water	12/9/98	1000	HNO3	1		✓	X	

SAMPLES COLLECTED BY: BRIAN TANAKA

RELINQUISHED BY: [signature]

COURIER AND AIR BILL NUMBER:

RECEIVED BY: [signature] DATE: 12/9/98 TIME: 1630

COOLER TEMPERATURE UPON RECEIPT:

SAMPLE'S CONDITION UPON RECEIPT

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Yellow - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type G	C	F	QC
① Site1E 1177 @3'	X			
② Site1E 1179 @3'	X			
③ Site1E 1175 @3'	X			
④ Site1E 1173 @3'	X			
⑤ Site1E 1178 @2.5	X			
⑥ Site1E 1187 @2.5	X	DUP		X
⑦ Site1E 1171 @3'	X			
⑧ Site1E 1163 @2.5	X			
⑨ Site1E 1165 @3'	X			
⑩ RINSE ~ Rinse				X

12/16/98

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

OHM Remediation Services Corp
Subsidiary of OHM Corporation
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CHAIN-OF-CUSTODY RECORD

Page 2 of 3

LABORATORY COPY
213760

FORM 0019 REV. 2-97

OHM's LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
Dwayne Ishida	949·263·9124.525	949.475.5433			
PROJECT NAME: Camp Pendleton	PROJECT LOCATION Site 1E/1F	PROJECT NUMBER 19739	LABORATORY PHONE	LABORATORY FAX	RECIPIENT NAME
PROJECT CONTACT Dwayne Ishida	PROJECT PHONE NUMBER as above	PROJECT FAX 949.263.1147	LABORATORY ADDRESS		ADDRESS
PROJECT ADDRESS 2031 Main Street	CITY, STATE AND ZIPCODE IRVINE CA	CLIENT USNAVY SWDIV	CITY, STATE AND ZIPCODE		CITY, STATE AND ZIPCODE
PROJECT MANAGER MAX PAN	PROJECT MANAGER'S PHONE 949.263.9124 522	PROJECT MANAGER'S FAX 949.263.1147			

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont	QC Level	T.A.T	Analyses: Metals	Comments
1	19739·075	Soil	12/9/98	1045	—	1		5day	X	MS/MSD Site 1E
2	19739·076			1225	—	1			X	Site 1F
3	19739·077			1235	—	1			X	
4	19739·078			1240	—	1			X	
5	19739·079			1300	—	1			X	
6	19739·080			1310	—	1			X	
7	19739 081			1311	—	1			X	
8	19739 082			1312	—	1			X	
9	19739083			1313	—	1			X	
10	19739 084			1317	—	1			X	

SAMPLES COLLECTED BY: BRIAN TANAKA — COURIER AND AIR BILL NUMBER:

COOLER TEMPERATURE UPON RECEIPT:

RELINQUISHED BY	RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
		12/9/98	1630	

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Yellow - Project Data Manager

the Big Up

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 570307

Page 1 of 2

Project Name/No.[1] Pendleton/919739

Sample Team Members[2] Shane Austin

Profit Center No.[3]

Project Manager[4] Max Tan

Purchase Order No.[6] 98723

Required Report Date[11] 8/31/99

Samples Shipment Date[7] 8-25-99

Lab Destination[8] APCL

Lab Contact[9] Frank Monteith

Project Contact/Phone[12] Dwayne Ishida (949)660-7501

Carrier/Waybill No.[13] courier

Bill to:[5]

Report to:[10] Fax Results to
Jim Cirillo (949) 475-5433
Shane Austin (760) 385-0134

White: To accompany samples

Yellow: Field copy

*See back of form for special instructions.

ONE CONTAINER PER LINE

Sample Number[14]	Sample Description/Type[15]	Date/Time Collected[16]	Container Type[17]	Sample Volume[18]	Preservative[19]	Requested Testing Program[20]	Condition on Receipt[21]	Disposal Record No.[22]
19739-584	IE 1195 @ 1.5'/soil	8-25-99 1115	AG	8oz	NA		received in Good Condition	
19739-585	IE 1195 @ 3.0'/soil	8-25-99 1130	AG	8oz		IE metals	temp	
19739-586	IE 1194 @ 1.5'/soil	8-25-99 1143	AG	8oz		Aluminum, Antimony, Arsenic, Cadmium, Chromium, Cobalt, Copper, Iron, Lead, Zinc.	custody	Seal ok
19739-587	IE 1194 @ 3.0'/soil	8-25-99 1202	AG	8oz				
19739-588	IE 1193 @ 1.5'/soil	8-25-99 1221	AG	8oz		Level IV		
19739-589	IE 1193 @ 3.0'/soil	8-25-99 1243	AG	8oz				
~~19739-590~~	~~IE F8-01 @ 0.5~~ (BA)							
19739-590	EB water	8-25-99 1352	Plastic	1 liter	HNO_3			

FOR LAB USE ONLY

FOR LAB USE ONLY

Special Instructions:[23] 19739-585, -587, -589, -592, -593, -596, -598 on Hold

Possible Hazard Identification:[24]
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal:[25]
Return to Client ☐ Disposal by Lab ☑ Archive _____ (mos.)

Turnaround Time Required:[26]
Normal ☐ Rush ☑ 72 hour

QC Level:[27]
I. ☐ II. ☐ III. ☐ Project Specific (specify): EPA Level III unless noted

1. Relinquished by[28] (Signature/Affiliation) Shane Austin IT/OHM	Date: 8-25-99 Time: 1549	1. Received by[28] (Signature/Affiliation) APCL	Date: 8-25-99 Time: 1549
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments:[29]

MCA 3/15/91

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)*

Reference Document No.: 70307
Page 2 of 2

Project Name Pendleton 919739 Project No. 919739 Samples Shipment Date 8-25-99

ONE CONTAINER PER LINE

Sample 14 Number	Sample 15 Description/Type	Date/Time 16 Collected	Container 17 Type	Sample 18 Volume	Pre-19 servative	Requested Testing 20 Program	Condition on 21 Receipt	Disposal 22 Record No.
19739-591 (5th)	IEF8-01@0.5'/soil	8-25-99 1400	AG	8oz	NA	IE Metals		
19739-592 (6th)	IEF8-02@2.0'/soil	8-25-99 1405	AG	8oz		Aluminum, Antimony, Arsenic, Cadmium, Chromium Cobalt, Copper, Iron, Lead Zinc	FOR LAB USE ONLY	
19739-593 (6th)	IEF8-02D@2.0'/soil	8-25-99 1405	AG	8oz				
19739-594	IEF7-01@0.5'/soil	8-25-99 1417	AG	8oz			FOR LAB USE ONLY	
19739-595	IEF7-01D@0.5'/soil	8-25-99 1417	AG	8oz				
19739-596	IEF7-02@2.0'/soil	8-25-99 1423	AG	8oz			FOR LAB USE ONLY	
19739-597	IEF6-01@0.5'/soil	8-25-99 1430	AG	8oz				
19739-598	IEF6-02@2.0'/soil	8-25-99 1441	AG	8oz			FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	

Shaw 8-25-99

No. - VII - April 5-99

White: To accompany samples Yellow: Field copy

*See back of form for special instructions.

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DO 105

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD*

Reference Document No. 570309
Page 1 of 3

Project Name/No.[1] PENDLETON/19739
Sample Team Members[2]
Profit Center No.[3] —
Project Manager[4] MAX PAN
Purchase Order No.[6] 98723
Required Report Date[11] 9/2/99

Samples Shipment Date[7] 8/30/99
Lab Destination[8] APCL
Lab Contact[9] FRANK MONTEITH
Project Contact/Phone[12] DWAYNE ISHIDA (949) 680-7561
Carrier/Waybill No.[13] COURIER

5616

Bill to:[5]

Report to:[10] FAX RESULTS TO:
JIM CIRILLO (949) 475-5433
JULIA WEGNER (760) 385-0134

ONE CONTAINER PER LINE

	Sample Number[14]	Sample Description/Type[15]	Date/Time Collected[16]	Container Type[17]	Sample Volume[18]	Preservative[19]	Requested Testing Program[20]	Condition on Receipt[21]	Disposal Record No.[22]
	19739-601	1E-GP-01 @ 0.5' SOIL	8/30/99 1000	8 OZ AG	8 OZ	N/A			
*	19739-602	1E-GP-02 @ 2.0' SOIL	1015						
	19739-603	1E-G2-01 @ 0.5' SOIL	1000				ALUMINUM, ANTIMONY, ARSENIC, CADMIUM, CHROMIUM, COBALT, COPPER, IRON, LEAD, ZINC PER THE SOW	FOR LAB USE ONLY	
*	19739-604	1E-G2-02 @ 2.0' SOIL	1013						
	19739-605	1E-F2-01 @ 0.5' SOIL	1025						
*	19739-606	1E-F2-02 @ 2.0' SOIL	1038					FOR LAB USE ONLY	
	19739-607	1E-F3-01 @ 0.5' SOIL	1030						
*	19739-608	1E-F3-02 @ 2.0' SOIL	1041						

Special Instructions:[23] * HOLD

Possible Hazard Identification:[24]
Non-hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐

Sample Disposal:[25]
Return to Client ☐ Disposal by Lab ☑ Archive _____ (mos.)

Turnaround Time Required:[26]
Normal ☐ Rush ☑ 72 HRS

QC Level:[27]
I. ☐ II. ☐ III. ☐ Project Specific (specify): EPA LEVEL III UNLESS SPECIFIED

1. Relinquished by[28] (Signature/Affiliation) James Cirillo IT Corp	Date: 8/30/99 Time: 1714	1. Received by[28] (Signature/Affiliation) APCL	Date: 8-30-99 Time: 1714
2. Relinquished by (Signature/Affiliation)	Date: Time:	2. Received by (Signature/Affiliation)	Date: Time:
3. Relinquished by (Signature/Affiliation)	Date: Time:	3. Received by (Signature/Affiliation)	Date: Time:

Comments:[29] 1. ALL SAMPLES ARE GRABS.
2. WBS #: 02009000
3. LN #:

MCA 3/15/91

White: To accompany samples
Yellow: Field copy
*See back of form for special instructions.

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)*

Reference Document No.[3] 10309
Page 2 of 3

Project Name PENDLETON Project No. 19739 Samples Shipment Date 8/30/99

ONE CONTAINER PER LINE

	Sample[14] Number	Sample[15] Description/Type	Date/Time[16] Collected	Container[17] Type	Sample[18] Volume	Pre-[19] servative	Requested Testing[20] Program	Condition on[21] Receipt	Disposal[22] Record No.
	19739-609	1E-E4-01 @ 0.5' SOIL	8/30/99 1053	Ag	8 oz	N/A			
*	19739-610	1E-E5-02 @ 2.0' SOIL	1105						
	19739-611	1E-E5-01 @ 0.5' SOIL	1101				LEVEL IV QC		
*	19739-612	1E-E5-02 @ 2.0' SOIL	1115						
	19739-613	EQUIPMENT RINSATE WATER	1120	POLY	1 L	HNO_3			
	19739-614	1E-D4-01 @ 0.5' SOIL	1132	Ag	8 oz	N/A			
*	19739-615	1E-D4-02 @ 2.0' SOIL	1140				ALUMINUM, ANTIMONY, ARSENIC, CADMIUM, CHROMIUM, COBALT, COPPER, IRON, LEAD, ZINC PER THE SOW		
	19739-616	1E-D5-01 @ 0.5' SOIL	1130						
*	19739-617	1E-D5-02 @ 2.0' SOIL	1146						
	19739-618	1E-C3-01 @ 0.5' SOIL	1159						
*	19739-619	1E-C3-02 @ 2.0' SOIL	1204						
	19739-620	1E-C4-01 @ 0.5' SOIL	1158						
*	19739-621	1E-C4-02 @ 2.0' SOIL	1210						
	19739-622	1E-D7-01 @ 0.5' SOIL	1306						
	19739-623	1E-D7-01 @ 0.5' SOIL	1307						
	19739-624	1E-D8-01 @ 0.5' SOIL	1307						
	19739-625	1E-D8-01 @ 0.5' SOIL	1308						
*	19739-626	1E-D7-02 @ 2.0' SOIL	1313				MS/MSD		
*	19739-627	1E-D8-02 @ 2.0' SOIL	1314						
	19739-628	1E-C7-01 @ 0.5' SOIL	1320						

FOR LAB USE ONLY

* HOLD dlr 8/30/99 1714

White: To accompany samples Yellow: Field copy

*See back of form for special instructions.

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD (cont.)*

Reference Document No.[3] 570309

Page 3 of 3

Project Name PENDLETON

Project No. 19739

Samples Shipment Date 8/30/99

ONE CONTAINER PER LINE

Sample[14] Number	Sample[15] Description/Type	Date/Time[16] Collected	Container[17] Type	Sample[18] Volume	Pre-[19] servative	Requested Testing[20] Program	Condition on[21] Receipt	Disposal[22] Record No.
19739-629	1E-C8[01] @0.5' SOIL	8/30/99 1320	AG	8 oz	N/A	ALUMINUM, ANTIMONY, ARSENIC, CADMIUM, CHROMIUM, COBALT, COPPER, IRON, LEAD, ZINC FOR THE SOW	56 FOR LAB USE ONLY	
* 19739-630	1E-C7[02] @2.0' SOIL	1325					FOR LAB USE ONLY	
* 19739-631	1E-C8[01] @2.0' SOIL	1326					FOR LAB USE ONLY	
19739-632	1E-E6[01] @0.5' SOIL	1334					FOR LAB USE ONLY	
* 19739-633	1E-E6[02] @2.0' SOIL	1338					FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	
							FOR LAB USE ONLY	

8/30/99

* HOLD

8/30/99 1714

8/30/99 1714

White: To accompany samples Yellow: Field copy

*See back of form for special instructions.

MCA 3/15/91

COMPLETED 10/21/99

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IT Corporation
2790 Mosside Blvd.
Monroeville, PA 15146-2792
(412)372-7701

CHAIN-OF-CUSTODY RECORD

FAX RESULTS TO JIM CIRILLO JULIA WEGNER (760) 385-0134

WBS # 0200995C LN # 1

PROJECT DATA MANAGER'S COPY

A 10112

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAYNE ISHIDA	(949) 261-6441	(949) 475-5433	99-6408	FRANK MONTEITH	
PROJECT NAME: PENDLETON	**PROJECT LOCATION** DC 105	**PROJECT NUMBER** 919739	**LABORATORY PHONE** (909) 590-1828	**LABORATORY FAX** (909) 590-1498	**RECIPIENT NAME**
PROJECT CONTACT JIM CIRILLO	**PROJECT PHONE NUMBER** (949) 261-6441	**PROJECT FAX** (949) 475-5433	**LABORATORY ADDRESS**		**ADDRESS**
PROJECT ADDRESS 3347 MICHELSON DR	**CITY, STATE AND ZIP CODE** IRVINE CA 92612	**CLIENT** SW DIV	**CITY, STATE AND ZIP CODE**		**CITY, STATE AND ZIP CODE**
PROJECT MANAGER MAX PAN	**PROJECT MANAGER'S PHONE** (949) 261-6441	**PROJECT MANAGER'S FAX**			

1 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: METALS (1E)	Comments
1	19739-838	SOIL	10/21/99	1206	N/A	1	IV	72-hr	X	
2	19739-839			1222		1	III			HOLD
3	19739-840			1235		1	III		X	
4	19739-841			1258		1	III			HOLD
5	19739-842			1320		1	III		X	
6	19739-843			1325		1	III			HOLD
7	19739-844			1340		1	III		X	
8	19739-845			1342		1	III		X	HOLD
9	19739-846			1426		1	III			HOLD
10	19739-847	WATER		1431		1	III		X	

SAMPLES COLLECTED BY:

RELINQUISHED BY: IT GROUP

COURIER AND AIR BILL NUMBER:

RECEIVED BY

DATE: 10/21/99 TIME: 1600

COOLER TEMPERATURE UPON RECEIPT:

SAMPLE'S CONDITION UPON RECEIPT:

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type: G	C	F	QC
~~1E-727-01~~ C 0.5'	X			
1E-Q10-01 ~~1E-727-02~~ C 2.0	X			
1E-Q10-02 ~~1E-731-01~~ C 0.5	X			
1E-Q11-01 ~~1E-731-02~~ C 1.5 *	X			
1E-Q11-02 ~~1E-728-01~~ C 0.5	X			
1E-P10-01 ~~1E-728-02~~ C 2.0	X			
1E-P1C-02 ~~1E-730-01~~ C 0.5	X			
1E-P9-01 ~~1E-730-01~~ C 0.5	X			X
DUPLICATE 1E-P9-01 ~~1E-730-02~~ C 1.5	X			
1E-P9-02 Eq. RINSATE	X			X

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

COMPLETED 12/1/99

the i group

IT Corporation
2790 Mosside Blvd.
Monroeville, PA 15146-2792
(412)372-7701

CHAIN-OF-CUSTODY RECORD

PROJECT DATA MANAGER'S COPY

A 10113

WBS # 0200995C
LN #

JIM CIRILLO
JOHN WEGNER
(714) 385-6154

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAINE ISHIDA	(949) 261-6441	(949) 475-5433	99-6408	FRANK MONTEITH	
PROJECT NAME: PENDLETON	**PROJECT LOCATION** DC 105	**PROJECT NUMBER** 719739	LABORATORY PHONE (909) 590-1828	LABORATORY FAX (909) 590-1498	RECIPIENT NAME
PROJECT CONTACT JIM CIRILLO	PROJECT PHONE NUMBER (949) 261-6441	PROJECT FAX (949) 475-5433	LABORATORY ADDRESS		ADDRESS
PROJECT ADDRESS 3347 MICHELSON DR	CITY, STATE AND ZIP CODE IRVINE, CA 92612	CLIENT	CITY, STATE AND ZIP CODE		CITY, STATE AND ZIP CODE
PROJECT MANAGER MAX PAN	PROJECT MANAGER'S PHONE (949) 261-6441	PROJECT MANAGER'S FAX			

2 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses (METALS (E))	Comments
1	19739-S48	SOIL	12/1/99	1440	N/A	1	III	72-hr	X	
2	19739-S49			1448		1	III			HOLD
3	19739-S50			1454		1	III		X	
4	19739-S51			1458		1	III			HOLD
5	19739-S52			1504		1	III		X	
6	19739-S53			1508		1	III			HOLD (Hz) 7/14/00
7	19739-S54			1514		1	IV		X	
8	19739-S55			1517		1	III			HOLD
9										
10										

SAMPLES COLLECTED BY:

RELINQUISHED BY: IT GROUP

COURIER AND AIR BILL NUMBER:

RECEIVED BY

DATE: 12/2/99

TIME: 1600

COOLER TEMPERATURE UPON RECEIPT:

SAMPLE'S CONDITION UPON RECEIPT

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section For Project Personnel Only Do Not Submit to Laboratory

Sample Point Location	Sample Type G	C	F	QC
~~IE-732-01~~ @0.5'	X			
IE-P11-01				
~~IE-732-02~~ @2.0'	X			
IE-P11-02				
~~IE-733-01~~ @0.5'	X			
IE-Q11-01				
~~IE-733-02~~ @2.0'	X			
IE-Q11-02				
~~IE-737-01~~ @0.5'	X			
IE-R12-01				
~~IE-737-02~~ @2.0'	X			
IE-R12-02				
~~IE-736-67'-01~~ @0.5'	X			
IE-Q13-01				
~~IE-736-67'-02~~ @2.0'	X			
IE-Q13-02				

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

the group — IT Corporation, 2790 Mosside Blvd., Monroeville, PA 15146-2792, (412)372-7701

CHAIN-OF-CUSTODY REC

WBS # 0200.000
PC # 98723

PROJECT DATA MANAGER'S COPY

A 10114

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAYNE ISHIDA	(949) 261-6441	(949) 475-5433	99-6501	FRANK MONTEITH	
PROJECT NAME: PENDLETON	**PROJECT LOCATION** DC 105	**PROJECT NUMBER** 99739	LABORATORY PHONE (909) 510-1828	LABORATORY FAX (909) 370-1498	RECIPIENT NAME
PROJECT CONTACT JIM CIRILLO	PROJECT PHONE NUMBER (949) 261-6441	PROJECT FAX (949) 475-5433	LABORATORY ADDRESS		ADDRESS
PROJECT ADDRESS 3347 MICHELSON DR	CITY, STATE AND ZIP CODE IRVINE, CA 92612	CLIENT SW DIV	CITY, STATE AND ZIP CODE		CITY, STATE AND ZIP CODE
PROJECT MANAGER MAX PAN	PROJECT MANAGER'S PHONE (949) 261-6441	PROJECT MANAGER'S FAX			

p. 1 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: METALS (1E)	TPHC 1E METHOD	Comments
1	19739-856	SOIL	10/27/99	0847	N/A	1	III	72 hr	X		
2	19739-857			0852		1	III				HOLD
3	19739-858			0900		1	III		X		
4	19739-859			0906		1	III				HOLD
5	19739-860	WATER		0912	HNO_3	1	III		X	X DELETE JAC	
6	19739-860	SOIL		0912	N/A	1	III			X JAC	
7	19739-861			0921		1	III		X		
8	19739-862			0922		1	III		X		
9	19739-863			0930		1	III				HOLD
10	~~19739-864~~			1000		1	III		X	CANCELLED JAC 10/27/99	

SAMPLES COLLECTED BY: JAC
RELINQUISHED BY: [signature] (IT GROUP)

COURIER AND AIR BILL NUMBER:
RECEIVED BY: [signature]
DATE: 10/27/99
TIME: 1645

COOLER TEMPERATURE UPON RECEIPT:
SAMPLE'S CONDITION UPON RECEIPT

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section For Project Personnel Only Do Not Submit to Laboratory

Sample Point Location	Sample Type G	C	F	QC
(1) ~~IE-736-01~~ @0.5' JAC 11/23/99 IE-R10-01	X			
(2) ~~IE-736-02~~ @2.0' JAC 11/23/99 IE-R10-02	X			
(3) ~~IE-734-01~~ @0.5' JAC 11/23/99 IE-R11-01	X			
(4) ~~IE-734-02~~ @2.0' JAC 11/23/99 IE-R11-02	X			
(5) Eq. RINSATE	X			X
(6) Eq. RINSATE	X			X
(7) ~~IE-736-01~~ @0.5' JAC 11/23/99 IE-Q12-01	X			
(8) ~~IE-736-01~~ @0.5' JAC 11/23/99 DUPLICATE IE-Q12-01	X			X
(9) ~~IE-736-02~~ @2.0' JAC 11/23/99 IE-Q12-02	X			
(10) ~~IE-740-01~~ @ JAC CANCELLED	X			

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

[redacted]

COMPLETED 11/23

the i group

IT Corporation
2790 Mosside Blvd.
Monroeville, PA 15146-2792
(412)372-7701

CHAIN-OF-CUSTODY RECORD

WBS # 12009950
PO # 98723

FAX RESULTS TO PROJECT DATA MANAGER'S COPY
JIM CIRILLO AND JULIA WEGNER (760) 385-1734

A 10123

FORM 0019 REV. 9-99

T'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAYNE ISHIDA	(949) 261-6441	(949) 475-5433	99-6802	FRANK MENTEITH	
PROJECT NAME: PENDLETON	PROJECT LOCATION DO 105	PROJECT NUMBER 719739	LABORATORY PHONE (919) 541-1878	LABORATORY FAX (919) 541-1498	RECIPIENT NAME
PROJECT CONTACT JIM CIRILLO	PROJECT PHONE NUMBER (949) 261-6441	PROJECT FAX (949) 475-5433	LABORATORY ADDRESS		ADDRESS
PROJECT ADDRESS 3347 MICHELSON DR	CITY, STATE AND ZIP CODE IRVINE, CA 92612	CLIENT SW DIV	CITY, STATE AND ZIP CODE		CITY, STATE AND ZIP CODE
PROJECT MANAGER MAX PAN	PROJECT MANAGER'S PHONE (949) 261-6441	PROJECT MANAGER'S FAX			

p. 1 of 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: METALS (IE)	Comments
1	19739-917	SOIL	11/19	1240	N/A	1	C	72-hr	X	
2	19739-918	↓		1244	↓	1	C	↓		HOLD
3	19739-919	WATER		1248	HNO_3	1	C	5-day	X	
4	19739-920	SOIL		1251	N/A	1	D	72-hr	X	
5	19739-921			1254		1	C		X	
6	19739-922			1300		1	C			HOLD
7	19739-923			1256		1	C		X	
8	19739-924			1300		1	C			HOLD
9	19739-925			1310		1	C		X	
10	19739-926	↓	↓	1314	↓	1	C	↓		HOLD

COOLER TEMPERATURE UPON RECEIPT:

SAMPLES COLLECTED BY: JAE

RELINQUISHED BY: JAE

COURIER AND AIR BILL NUMBER:

RECEIVED BY: Elaine Ve

DATE: 11/19/99 TIME: 1608

SAMPLE'S CONDITION UPON RECEIPT

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type: G	C	F	QC
(1) IE-L15-01 @0.5' (IE-758-01 @ 0.5')	X			
(2) IE-L15-02 @2.0' (IE-758-02 @ 2.0')	X			
(3) EQUIPMENT RINSATE (IE)	X			X
(4) IE-K15-01 @0.5' (IE-757-01 @0.5')	X			
(5) IE-K15-01 @0.5' (IE-757-01 @0.5' DUP)	X			X
(6) IE-K15-02 @2.0' (IE-757-02 @ 2.0')	X			
(7) IE-M14-01 @0.5' (IE-759-01 @0.5')	X			
(8) IE-M14-02 @2.0' (IE-759-02 @2.0')	X			
(9) IE-L14-01 @0.5' (IE-760-01 @ 0.5')	X			
(10) IE-L14-02 @2.0' (IE-760-02 @ 2.0')	X			

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

COMPLETED 11/11/99

the group — IT Corporation, 2790 Mosside Blvd., Monroeville, PA 15146-2792, (412)372-7701

CHAIN-OF-CUSTODY RECORD

FAX RESULTS TO PROJECT DATA MANAGER'S COPY

WBS # 0207950
DR # 98723

JIM CIRILLO AND JULIA WEBSTER (760)385-0134

A 10124

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAYNE ISHIDA	(949) 261-6441	(949) 475-5433	99-6802	FRANK MONTEITH	
PROJECT NAME: DENDLETON	**PROJECT LOCATION** DC 105	**PROJECT NUMBER** 119739	**LABORATORY PHONE** (909)590-1828	**LABORATORY FAX** (909)590-1498	**RECIPIENT NAME**
PROJECT CONTACT JIM CIRILLO	**PROJECT PHONE NUMBER** (949) 261-6441	**PROJECT FAX** (949) 475-5433	**LABORATORY ADDRESS**		**ADDRESS**
PROJECT ADDRESS 3347 MICHELSON DR	**CITY, STATE AND ZIP CODE** IRVINE, CA 92612	**CLIENT** SW DIV	**CITY, STATE AND ZIP CODE**		**CITY, STATE AND ZIP CODE**
PROJECT MANAGER MAX PAN	**PROJECT MANAGER'S PHONE** (949) 261-6441	**PROJECT MANAGER'S FAX**			

P. 2 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses METALS (IE)	Comments
1	19739-927	SOIL	11/10/99	1307	N/A	1	C	72-hr	X	
2	19739-928			1312		1	C			HOLD
3	19739-929			1334		1	C		X	
4	19739-930			1339		1	C			HOLD
5	19739-931			1339		1	C		X	
6	19739-932			1344		1	C			HOLD
7	19739-933			1348		1	C		X	
8	19739-934			1353		1	D			HOLD
9										
10										

SAMPLES COLLECTED BY:

COURIER AND AIR BILL NUMBER:

COOLER TEMPERATURE UPON RECEIPT:

RELINQUISHED BY	RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
		11/11/99	1608	

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type G	C	F	QC
(1) IE-K14-01 @0.5' (IE-761-01 @0.5')	X			
(2) IE-K14-02 @2.0' (IE-761-02 @2.0')	X			
(3) IE-014-01 @0.5' (IE-764-01 @0.5')	X			
(4) IE-014-02 @2.0' (IE-764-02 @2.0')	X			
(5) IE-013-01 @0.5' (IE-765-01 @0.5')	X			
(6) IE-013-02 @2.0' (IE-765-02 @2.0')	X			
(7) IE-N14-01 @0.5' (IE-763-01 @0.5')	X			
(8) IE-N14-02 @2.0' (IE-763-02 @2.0')	X			

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

COMPLETED 12/1/11

CHAIN-OF-CUSTODY RECORD

PROJECT DATA MANAGER'S COPY

A 10125

the igroup

IT Corporation
2790 Mosside Blvd.
Monroeville, PA 15146-2792
(412)372-7701

WBS# 0200950
DO# 98723

For Results To
Jim Cirillo
Julie Wegner (760) 385-0134

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
Dwayne Ishida	(949) 261-6441	(949) 475-5433	99-6829	Frank Monticth	
PROJECT NAME	**PROJECT LOCATION**	**PROJECT NUMBER**	**LABORATORY PHONE**	**LABORATORY FAX**	**RECIPIENT NAME**
Pendleton	DO 105	919739	(909) 590-1828	(909) 590-1498	
PROJECT CONTACT	**PROJECT PHONE NUMBER**	**PROJECT FAX**	**LABORATORY ADDRESS**		**ADDRESS**
Jim Cirillo	(949) 261-6441	(949) 475-5433			
PROJECT ADDRESS	**CITY, STATE AND ZIP CODE**	**CLIENT**	**CITY, STATE AND ZIP CODE**		**CITY, STATE AND ZIP CODE**
3347 Michelson Rd	Irvine CA 92612	SWDIV			
PROJECT MANAGER	**PROJECT MANAGER'S PHONE**	**PROJECT MANAGER'S FAX**			
Max Pan	(949) 261-6441				

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses Metals IE	Comments
1	19739-935	Soil	11-12-11	1310	N/A	1	C	72hr		~~① IE-Q12-03~~
2	19739-936	↓	↓	1310	↓	1	C	↓		
3	19739-937			1325		1	C			Hold
4	19739-938			1339		1	C			
5	19739-939			1345		1	C			Hold
6	19739-940	Water	11-12-11	1350	HNO_3	1	C	5-day		
7										
8										
9										
10										

SAMPLES COLLECTED BY: Shana Austin
RELINQUISHED BY: Shana Austin

COURIER AND AIR BILL NUMBER:
RECEIVED BY:

DATE: 11-12-11 TIME: 1450

COOLER TEMPERATURE UPON RECEIPT:

SAMPLE'S CONDITION UPON RECEIPT

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type G	C	F	QC
① IE-Q12-03 @ 0.5'	X			
② IE-Q12-03D @ 0.5' Duplicate	X			X
③ IE-Q12-04 @ 2.0'	X			
④ IE-R10-03 @ 0.5'	X			
⑤ IE-R10-04 @ 2.0'	X			
⑥ Equipment Rinsate	X			X

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

the i group

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(412)372-7701

CHAIN-OF-CUSTODY RECORD

WBS # 02009950
PO # 98723

FAX RESULTS TO JIM CIRILLO AND SHANE AUSTIN (760) 385-0139

LABORATORY A 10129

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAYNE ISHIDA	(949) 261-6441	(949) 475-5433		FRANK MONTEITH	IT CORP
PROJECT NAME: PENDLETON	**PROJECT LOCATION** DO 105	**PROJECT NUMBER** 919739	**LABORATORY PHONE** (909) 590-1828	**LABORATORY FAX** (909) 590-1498	**RECIPIENT NAME** DWAYNE ISHIDA
PROJECT CONTACT JIM CIRILLO	**PROJECT PHONE NUMBER** (949) 261-6441	**PROJECT FAX** (949) 475-5433	**LABORATORY ADDRESS**		**ADDRESS** 3347 MICHELSON DR, # 200
PROJECT ADDRESS 3347 MICHELSON DR	**CITY, STATE AND ZIP CODE** IRVINE, CA 92612	**CLIENT** SW DIV	**CITY, STATE AND ZIP CODE**		**CITY, STATE AND ZIP CODE** IRVINE, CA 92612
PROJECT MANAGER MAX PAN	**PROJECT MANAGER'S PHONE** (949) 261-6441	**PROJECT MANAGER'S FAX**			

1 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: IE METALS								Comments
1	19739-953	SOIL	12/3/99	0857	N/A	1	D	5-day	X								
2	19739-954	SOIL		0900		1	C										HOLD
3	19739-955	SOIL		0856		1	D		X								
4	19739-956	SOIL		0901		1	C										HOLD
5	19739-957	WATER		0915	HNO_3	1	C		X								
6	19739-958	SOIL		0922	N/A	1	C		X								
7	19739-959	SOIL		0926		1	C										HOLD
8	19739-960	SOIL		0919		1	D		X								
9	19739-961	SOIL		0923		1	C										HOLD
10	19739-962	SOIL		0947		1	C		X								

7107

SAMPLES COLLECTED BY: JAY ISA

RELINQUISHED BY	COURIER AND AIR BILL NUMBER: / RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
IT CORP		12/3/99	1109	

COOLER TEMPERATURE UPON RECEIPT:

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

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CHAIN-OF-CUSTODY RECORD

WBS # 02009950
PO # 98723

FAX RESULTS TO JIM CIRILLO AND SHANE AUSTIN (760)395-0134

LABORATORY A 10130

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR: DWAYNE ISHIDA	LAB COORDINATOR'S PHONE: (949) 261-6441	LAB COORDINATOR'S FAX: (949) 475-5433	LABORATORY SERVICE ID:	LABORATORY CONTACT: FRANK MONTEITH	MAIL REPORT (COMPANY NAME): IT CORP
PROJECT NAME: PENDLETON	PROJECT LOCATION: DO 105	PROJECT NUMBER: 919739	LABORATORY PHONE: (949)590-1828	LABORATORY FAX: (949) 590-1498	RECIPIENT NAME: DWAYNE ISHIDA
PROJECT CONTACT: JIM CIRILLO	PROJECT PHONE NUMBER: (949)261-6441	PROJECT FAX: (949) 475-5433	LABORATORY ADDRESS:		ADDRESS: 3347 MICHELSON DR #200
PROJECT ADDRESS: 3347 MICHELSON DR	CITY, STATE AND ZIP CODE: IRVINE, CA 92612	CLIENT: SW DIV	CITY, STATE AND ZIP CODE:		CITY, STATE AND ZIP CODE: IRVINE, CA 92612
PROJECT MANAGER: MAX PAN	PROJECT MANAGER'S PHONE: (949) 261-6441	PROJECT MANAGER'S FAX:			

2 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses METALS (JE)	Comments
1	19739-963	SOIL	12/3/99	0954	N/A	1	C	5-day		HOLD
2	19739-964			1001		1	C		X	
3	19739-965			1005		1	C			HOLD
4	19739-966			1019		1	C		X	
5	19739-967			1020		2	C		X	
6	19739-968			1022		1	C			HOLD
7	19739-969			1048		2	C		X	
8	19739-970			1052		2	C			HOLD
9										
10										

7107

12/3/99

SAMPLES COLLECTED BY	COURIER AND AIR BILL NUMBER:	COOLER TEMPERATURE UPON RECEIPT:

RELINQUISHED BY	RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
IT Corp		12/3/99	1109	

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

COMPLETED 1800 3/17/00

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CHAIN-OF-CUSTODY RECORD

PROJECT DATA MANAGER'S COPY

A 10179

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
Dwayne Ishida	(949) 660-7550 ext 61	(949) 475-5433	00-01982 (per 3/9/00)	APCL	IT Corporation
PROJECT NAME:	**PROJECT LOCATION**	**PROJECT NUMBER**	**LABORATORY PHONE**	**LABORATORY FAX**	**RECIPIENT NAME**
D.O. 105	Camp Pendelton, CA	919739	(909) 590-1828	—	Dwayne Tshida
PROJECT CONTACT	**PROJECT PHONE NUMBER**	**PROJECT FAX**	**LABORATORY ADDRESS**		**ADDRESS**
Jim Cirillo	(949) 660-5317	(949) 475-5433	—		3347 Michelson Dr. Ste 200
PROJECT ADDRESS	**CITY, STATE AND ZIP CODE**	**CLIENT**	**CITY, STATE AND ZIP CODE**		**CITY, STATE AND ZIP CODE**
	Camp Pendelton	SW DIV	China, CA		IRVINE, CA 92612
PROJECT MANAGER	**PROJECT MANAGER'S PHONE**	**PROJECT MANAGER'S FAX**			
Max Pan	(949) 261-6441				

PAGE 1 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: METALS (ID)	METALS (IE)	Comments
1	19739-971	SOIL	2/29/00	0922	N/A	1	III	5 day	X		
2	19739-972	↓	↓	0926	↓	1	III	↓			HOLD
3	19739-973	WATER		0937	HNO_3	1	III		X		
4	19739-974	SOIL		1015	N/A	1	III			X	
5	19739-975	↓	↓	1018	↓	1	III	↓			HOLD
6	19739-976			1027		1	IV			X	
7	19739-977			1030		1	III				HOLD
8	19739-978			1025		1	III			X	
9	19739-979			1030		1	III				HOLD
10	19739-980	↓	↓	1050	↓	1	III	↓		X	

SAMPLES COLLECTED BY: W. RE

COURIER AND AIR BILL NUMBER: FEDEX COURIER

COOLER TEMPERATURE UPON RECEIPT:

RELINQUISHED BY	RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
[signature]	[signature]	3/10/00	1145	

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type: G	C	F	QC
(1) ID-1037-01 @2.5'	X		X	
(2) ID-1037-02 @5.0'	X		X	
(3) EQUIPMENT RINSATE (ID)	X			X
(4) IE-PS01-01 @ STAKE-1.0'	X		X	X 2/24/00
(5) IE-PS01-02 @ STAKE-3.0'	X		X	
(6) IE-PS02-01 @ STAKE-1.5'	X		X	
(7) IE-PS02-02 @ STAKE-3.0'	X		X	
(8) IE-PS03-01 @ STAKE-0.5'	X		X	
(9) IE-PS03-02 @ STAKE-3.0'	X		X	
(10) IE-PS04-01 @ STAKE+5.0'	X		X	

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

COMPLETED 3/7/00

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CHAIN-OF-CUSTODY RECORD

PROJECT DATA MANAGER'S COPY

A 10180

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR: DWAYNE ISHIDA	LAB COORDINATOR'S PHONE: (949) 475-7561	LAB COORDINATOR'S FAX: (949) 475-5433	LABORATORY SERVICE ID: 00-1982	LABORATORY CONTACT: APCL	MAIL REPORT (COMPANY NAME): IT CORP
PROJECT NAME: D.C 105	PROJECT LOCATION: CAMP PENDLETON, CA	PROJECT NUMBER: 819739	LABORATORY PHONE: (909) 590-1828	LABORATORY FAX:	RECIPIENT NAME: DWAYNE ISHIDA
PROJECT CONTACT: JIM CIRILLO	PROJECT PHONE NUMBER: (949) 668-5317	PROJECT FAX: (949) 475-5433	LABORATORY ADDRESS:		ADDRESS: 3347 MICHELSON DR, #200
PROJECT ADDRESS:	CITY, STATE AND ZIP CODE: CAMP PENDLETON, CA	CLIENT: SW DIV	CITY, STATE AND ZIP CODE: CHINO, CA		CITY, STATE AND ZIP CODE: IRVINE, CA 92612
PROJECT MANAGER: MAX PAN	PROJECT MANAGER'S PHONE: (949) 261-6141	PROJECT MANAGER'S FAX:			

PAGE 2 OF 2

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: METALS (IE)	Comments
1	19739-981	SOIL	3/6/00	1052	N/A	1	III	5-day	X	
2	19739-982			1054		1	III			HOLD
3	19739-983			1050		1	III		X	
4	19739-984			1055		1	III			HOLD
5	19739-985			1109		1	III		X	
6	19739-986			1110		1	III		X	
7	19739-987			1119		1	III		X	
8	19739-988	WATER		1215	HNO3	1	III			
9										
10										

SAMPLES COLLECTED BY: [illegible] RELINQUISHED BY: [illegible]

COURIER AND AIR BILL NUMBER: FEDEX COURIER

RECEIVED BY	DATE	TIME
Richard Stevenson	3/7/00	11:45

COOLER TEMPERATURE UPON RECEIPT:

SAMPLE'S CONDITION UPON RECEIPT

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type G	C	F	QC
(1) IE-PS04-01 @ STAKE + 5.0' DUP	X		X	X
(2) IE-PS04-02 @ STAKE - 1.0'	X		X	
(3) IE-PS05-01 @ STAKE + 1.0'	X		X	
(4) IE-PS05-02 @ STAKE - 1.5'	X		X	
(5) IE-PS06-01 @ STAKE - 0.5'	X		X	
(6) IE-PS07-01 @ STAKE - 0.5'	X		X	
(7) IE-PS08-01 @ STAKE - 0.5'	X		X	
(8) EQUIPMENT RINSATE	X			X

Comments

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

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2790 Mosside Blvd.
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(412)372-7701

CHAIN-OF-CUSTODY RECORD

LABORATORY COPY
A 12313

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
Dwayne Ishida	(949) 660-7561	(949) 475-5433	—	APCL	IT Corp
PROJECT NAME	**PROJECT LOCATION**	**PROJECT NUMBER**	**LABORATORY PHONE**	**LABORATORY FAX**	**RECIPIENT NAME**
Pendleton 013 D0105	MCB Pendleton, CA	719739	(909) 590-1828	(909) 590-1498	Dwayne Ishida
PROJECT CONTACT	**PROJECT PHONE NUMBER**	**PROJECT FAX**	**LABORATORY ADDRESS**		**ADDRESS**
Jim Cirillo	(949) 660-5317	(949) 475-5433	—		3347 Michelson Dr #200
PROJECT ADDRESS	**CITY, STATE AND ZIP CODE**	**CLIENT**	**CITY, STATE AND ZIP CODE**		**CITY, STATE AND ZIP CODE**
—	—	SWDIV	—		Irvine, CA 92612
PROJECT MANAGER	**PROJECT MANAGER'S PHONE**	**PROJECT MANAGER'S FAX**			
Max Pan	(949) 660-7572	—			

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: TCLP	Analyses: Title 22 Metals	Comments
1	19739-1134	soil	9-29-00	1230	NA	1	III	5-day	X	X	
2	19739-1135	soil	9-29-00	1235	NA	1	III	5-day	X	X	
3	19739-1136	water	9-29-00	1245	HNO_3	1	III	5-day		X	
4											4973
5											
6											
7											
8											
9											
10											

SAMPLES COLLECTED BY: Shane Austin

COURIER AND AIR BILL NUMBER:

COOLER TEMPERATURE UPON RECEIPT: 4.1 °C

RELINQUISHED BY	RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
Shane Austin 09-29-00	Monica Valdez	9.29.00	1320	Samples Received In Good Condition

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

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CHAIN-OF-CUSTODY RECORD

LABORATORY COPY
A 11177

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAYNE ISHIDA	(949) 660-7561	(949) 475-5433		APCL	IT CORP
PROJECT NAME: DO 105	**PROJECT LOCATION** CAMP PENDLETON, CA	**PROJECT NUMBER** 919739	**LABORATORY PHONE** (909) 590-1828	**LABORATORY FAX** (909) 590-1498	**RECIPIENT NAME** DWAYNE ISHIDA
PROJECT CONTACT JIM CIRILLO	**PROJECT PHONE NUMBER** (949) 660-5317	**PROJECT FAX** (949) 475-5433	**LABORATORY ADDRESS** —		**ADDRESS** 3347 MICHELSON DR, #200
PROJECT ADDRESS —	**CITY, STATE AND ZIP CODE** CAMP PENDLETON, CA	**CLIENT** SW DIV	**CITY, STATE AND ZIP CODE** CHINO, CA		**CITY, STATE AND ZIP CODE** IRVINE, CA 92612
PROJECT MANAGER MAX PAN	**PROJECT MANAGER'S PHONE** (949) 261-6441	**PROJECT MANAGER'S FAX** —			

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: SITE LE METALS	Comments
1	19739-1019	SOIL	7/13/00	1001	N/A	1	4	5-days	X	
2	19739-1020			1003		1	3		X	
3	19739-1021			1010		1	3		X	3833
4	19739-1022			1033		1	3		X	
5	19739-1023			1042		1	3		X	
6	19739-1024			1050	HNO_3	1	3		X	
7	19739-1025			1103		1	3		X	
8	19739-1026			1108		1	3		X	
9	19739-1027			1125		1	3		X	
10	19739-1028			1134		1	3		X	

SAMPLES COLLECTED BY: JC

COURIER AND AIR BILL NUMBER: APCL COURIER

COOLER TEMPERATURE UPON RECEIPT: 3.8

RELINQUISHED BY	RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
James Cirillo	Laurel A Pollard	7/13/00	1600	Sample Received In Good Condition
Laurel A Pollard	[signature]	7/14/00	1145	

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

the group

IT Corporation
2790 Mosside Blvd.
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CHAIN-OF-CUSTODY RECORD

PROJECT FILE CARD
A 10169

FORM 0019 REV. 9-99

IT'S LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
DWAYNE ISHIDA	(949) 261-6441	(949) 475-5433	—	APCL	IT CORP
PROJECT NAME: MCB CAMP PENDLETON	**PROJECT LOCATION** DO 105	**PROJECT NUMBER** 9A9739	**LABORATORY PHONE** (909) 590-1828	**LABORATORY FAX** (909) 590-1498	**RECIPIENT NAME** DWAYNE ISHIDA
PROJECT CONTACT JIM CIRILLO	**PROJECT PHONE NUMBER** (949) 261-6441	**PROJECT FAX** (949) 475-5433	**LABORATORY ADDRESS** —		**ADDRESS** 3347 MICHELSON DR. SUITE 200
PROJECT ADDRESS SUITE 200 3347 MICHELSON DR.	**CITY, STATE AND ZIP CODE** IRVINE, CA 92612	**CLIENT** SW DIV	**CITY, STATE AND ZIP CODE** —		**CITY, STATE AND ZIP CODE** IRVINE, CA 92612
PROJECT MANAGER MAX FAN	**PROJECT MANAGER'S PHONE** (949) 261-6441	**PROJECT MANAGER'S FAX** (949) 660-7572			

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses: METALS	TITLE 22 METALS (Cd, As, Pb, Mn)	CAM 17 METALS	Comments
1	19739-1137	S	12/04/00	1114	NA	1	III	72 HRS.	X			Site IE
2	19739-1138	S	12/04/00	1118	NA	1	III	72 HRS.	X			
3	19739-1139	S		1124	NA				X			
4	19739-1140	W		1130	HNO_3				X			6009
5	19739-1141	S		1215	NA					X	X X	
6	19739-1142	S		1240						X	X X	
7	19739-1143	S		1300						X	X X	
8	19739-1144	S	↓	1306	↓	↓	↓	↓		X	X X	
9												
10												

SAMPLES COLLECTED BY: ROGER ORR / TRISHA SMITH

COURIER AND AIR BILL NUMBER:

COOLER TEMPERATURE UPON RECEIPT: 3.9°

RELINQUISHED BY	RECEIVED BY	DATE	TIME	SAMPLE'S CONDITION UPON RECEIPT
1238396		12/4/00	1119	Samples Received In Good Condition

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Manilla - Project Data Manager

APPENDIX F
REVIEW COMMENTS

Department of Toxic Substances Control

Edwin F. Lowry, Director
5796 Corporate Avenue
Cypress, California 90630

Winston H. Hickox
Agency Secretary
California Environmental
Protection Agency

Gray Davis
Governor

May 28, 2003

Mr. Mike Bilodeau
Southwest Division Naval Facilities
Engineering Command
1220 Pacific Highway, (Code 532. MB)
San Diego, California 92132-5190

APPROVAL OF DRAFT REMEDIAL ACTION SITE CLOSURE REPORT FOR SITE 1E, FORMER REFUSE BURNING GROUND IN 32 AREA, OPERABLE UNIT 3, MARINE CORPS BASE CAMP PENDLETON

Dear Mr. Bilodeau:

The Department of Toxic Substances Control (DTSC) has reviewed the above subject document dated March 28, 2003, prepared by IT Corporation. The report documents the remedial action activities, site backfilling and restoration, and confirmation sampling conducted at Installation Restoration (IR) Site 1E, Former Refuse Burning Ground in 32 Area, at Marine Corps Base Camp Pendleton. The volume of burn debris and contaminated soil removed from the site was approximately 59,085 cubic yards and was transported to and disposed of at the Corrective Action Management Unit located at IR Site 7, Box Canyon Landfill.

Based on the results of the confirmation sampling, the remedial action met the remediation standards specified in the Operable Unit 3 Record of Decision. DTSC agrees with the conclusions and recommendations of the report and we hereby approve it. The site is now considered closed and no long term operation, monitoring, or maintenance is needed.

We look forward to working with you to expedite the investigation and cleanup of the sites. If you have any questions, please call Mr. Tayseer Mahmoud, Remedial Project Manager, at (714) 484-5419.

Sincerely,

John E. Scandura, Chief
Office of Military Facilities
Southern California Operations

cc: Ms. Beatrice Griffey
Project Manager
San Diego Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, California 92123-4340

Mr. Martin Hausladen
Remedial Project Manager
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, California 94105-3901

Ms. La Rae Landers
Asst. Chief of Staff - Environmental Security
P.O. Box 555008, Building 22165
U.S. Marine Corps Base
Camp Pendleton, California 92055-5008

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

July 31, 2003

Department of the Navy
Southwest Division Naval facilities Engineering Command
Attn: Mr. Michael Bilodeau
1220 Pacific Highway
San Diego, California 92132-5190

Dear Mr. Bilodeau

Subject: Acceptance of Site 1E Completion/As-Builts, Site 9 Boring/Well Tech Memo, OU-4 Supplemental FS, and Site 7 GW Monitoring Tech Memo, Camp Pendleton Marine Corps Base, Camp Pendleton, California

The United States Environmental Protection Agency has reviewed the above referenced documents and finds that our concerns have been adequately addressed and we have no further comments on these documents.

If you have questions about our approval please feel free to contact me at (415) 972-3007 at any time.

Thank you for the opportunity to review this document and we look forward to future successes at Camp Pendleton.

Sincerely,

Martin Hausladen, RPM

Cc:
Department of Toxic Substances Control
Attn: Mr. Tayseer Mahmoud
5796 Corporate Ave
Cypress, ca. 90630

California Regional Water Quality Control Board
Attn: Ms. Beatrice Griffey
9174 Sky Park Drive, Suite 100
San Diego, Ca.92123-4340

California Regional Water Quality Control Board
San Diego Region

Winston H. Hickox
Secretary for
vironmental
Protection

Internet Address: http://www swrcb.ca gov/rwqcb9/
9174 Sky Park Court, Suite 100, San Diego California 92123
Phone (858) 467-2952 • FAX (858) 571-6972

Gray Davis
Governor

June 27, 2003

Department of the Navy
Southwest Division Naval Facilities Engineering Command (SWDIV)
Attn: Mr. Michael Bilodeau
1220 Pacific Highway
San Diego, California 92132-5190

File No. 30-0456.05

Dear Mr. Bilodeau:

SUBJECT: REVISED EXECUTIVE SUMMARY FOR DRAFT REMEDIAL ACTION SITE CLOSURE REPORT, OPERABLE UNIT 3, INSTALLATION RESTORATION SITE 1E, 32 AREA REFUSE-BURNING GROUND, MARINE CORPS BASE, CAMP PENDLETON, CALIFORNIA

The California Regional Water Quality Control Board (San Diego region, RWQCB) has reviewed the above referenced document (Revised Executive Summary) prepared by IT Corporation and submitted by the Department of the Navy June 23, 2003 via electronic mail. The Revised Executive Summary was submitted to address a deficiency noted in a RWQCB letter dated June 4, 2003 regarding the "Draft Remedial Action Site Closure Report, Operable Unit 3, Installation Restoration Site 1E, 32 Area Refuse-Burning Ground, Marine Corps Base, Camp Pendleton, California" (Draft Site 1E Closure Report). The deficiency was the absence of a discussion of the designation of Installation Restoration (IR) Site 1E-1, the 5 burn pits located immediately south of IR Site 1E. The Revised Executive Summary, which will be incorporated into the draft final version of the Site 1E Closure Report, addresses the sole concern raised by the RWQCB regarding the Draft Site 1E Closure Report.

If you have any questions regarding this letter, I may be reached by phone at (858) 467-2728 or by electronic mail at grifb@rb9. swrcb.ca.gov.

Sincerely,

Beatrice Griffey, M.Sc., RG
Associate Engineering Geologist
Site Mitigation and Cleanup Unit

BG;jpa;bg C:\Facilities\Camp Pendleton\CERCLA Prgrm\Various Reports\Closure Reports\Site 1E B.doc

Cc:
U.S. Environmental Protection Agency, Region 9
Attn: Mr. Martin Hausladen
75 Hawthorne St.
San Francisco, CA 94105-3901

Department of Toxic Substances Control
Attn; Mr. Tayseer Mahmoud
5796 Corporate Ave.
Cypress, CA 90630

Office of the Chief of Staff - Environmental Security
Environmental Engineering Division
Attn: Ms. La Rae Landers
P.O. Box 555008, Building 22165
U.S. Marine Corps Base, Camp Pendleton, CA 92055-5008

IT Corporation
Attn: Mr. Max Pan
3347 Michelson Drive, Suite 200
Irvine, CA 92612-1692

California Regional Water Quality Control Board
San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb9/
9174 Sky Park Court, Suite 100, San Diego, California 92123
Phone (858) 467-2952 • FAX (858) 571-6972

Gray Davis
Governor

June 4, 2003

Department of the Navy
Southwest Division Naval Facilities Engineering Command (SWDIV)
Attn: Mr. Michael Bilodeau
1220 Pacific Highway
San Diego, California 92132-5190

File No. 30-0456.05

Dear Mr. Bilodeau:

SUBJECT: DRAFT REMEDIAL ACTION SITE CLOSURE REPORT, OPERABLE UNIT 3, INSTALLATION RESTORATION SITE 1E, 32 AREA REFUSE-BURNING GROUND, MARINE CORPS BASE, CAMP PENDLETON, CALIFORNIA

The California Regional Water Quality Control (San Diego region, RWQCB) has reviewed the above referenced document (Report) prepared by IT Corporation, and dated March 28, 2003. The Report presents an overview of environmental activities conducted at Installation Restoration (IR) Site 1E to assess, characterize, and remediate conditions that posed a significant threat to human health and the environment. Between August 18, 1999 and November 19, 1999 approximately 59,085 cubic yards of waste was excavated from IR Site 1E and disposed of at the on-Base landfill (Box Canyon Landfill, IR Site 7), a designated corrective action management unit (CAMU). With the exception of iron, confirmation soil samples indicated remedial activities achieved the chemical of concern cleanup standards outlined in the Operable Unit 3 Record of Decision (OU 3 RoD). Regarding the iron cleanup standard, it was determined that background iron concentrations exceed the cleanup standard, hence achievement of the standard was not justified. From December 18, 2000 through January 12, 2001, site restoration and revegetation activities were performed.

Based on current knowledge of Site 1E conditions, the consultant concludes and recommends the following:

- site remediated in accordance with the OU 3 RoD,
- waste remaining does not pose a threat to human health or the environment,
- the site is considered a clean closure,
- 5-Year reviews are not required, and
- long term postclosure operation, monitoring, or maintenance is not required.

Based on the Report, it appears the consultant's conclusions and recommendations are correct and appropriate.

The Report is a well-written, formatted, and organized document that contains all the pertinent information necessary for review, however, there is one significant deficiency. The Report does not contain a discussion of the designation of IR Site 1E-1, the original 5 burn pits located immediately south of IR Site 1E. At a minimum, a discussion of the Site 1E-1 designation and inclusion in Operable Unit 4 is required in the Executive Summary of the Final Site 1E Closure Report.

If you have any questions regarding this letter, I may be reached by phone at (858) 467-2728 or by electronic mail at grifb@rb9.swrcb.ca.gov.

Sincerely,

Beatrice Griffey

Beatrice Griffey, M.Sc., RG
Associate Engineering Geologist
Site Mitigation and Cleanup Unit

BG;jpa;bg C:\Facilities\Camp Pendleton\CERCLA Prgrm\Various Reports\Closure Reports\Site 1E.doc

Cc:
U.S. Environmental Protection Agency, Region 9
Attn: Mr. Martin Hausladen
75 Hawthorne St.
San Francisco, CA 94105-3901

Department of Toxic Substances Control
Attn; Mr. Tayseer Mahmoud
5796 Corporate Ave.
Cypress, CA 90630

Office of the Chief of Staff - Environmental Security
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Attn: Ms. La Rae Landers
P.O. Box 555008, U.S. Marine Corps Base
Camp Pendleton, CA 92055-5008

IT Corporation
Attn: Mr. Max Pan
3347 Michelson Drive, Suite 200
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